THE MEDICAL JOURNAL OF AUSTRALIA

VOL. II.—27TH YEAR. SYDNEY, SATURDAY, SEPTEMBER 28, 1940. No. 13.

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EXPERIMENTAL STUDIES ON THE COMBINED SULPHANILAMIDE AND SERUM TREATMENT OF GAS GANGRENE INFECTIONS.

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IN a previous communication[1] from this institute the effect of various sulphanilamide drugs on experimental gas gangrene infections was reported. In brief, it was found that these compounds exhibited a weak action against *Clostridium welchii* and *Colstridium septicum*, but afforded no protection whatsoever against infection with *Clostridium œdematiens*. It did, however, appear that, following infection with *Clostridium welchii* and *Clostridium septicum*, but not with *Clostridium œdematiens*, sulphanilamides prevented a generalized infection. In mice that succumbed despite drug administration, no cultures were obtained from the heart blood, liver and spleen, so that death would appear to have been due to toxin production and absorption from the site of inoculation. In view of this it seemed that, at least in the case of *Clostridium welchii* and *Clostridium septicum* infections, it would be worth while to investigate the protective power of sulphanilamides combined with antitoxic serum.

In addition, attempts have been made to increase the resistance of animals against the effects of the toxin by treatment with desoxycorticosterone. It is now well known that most, if not all, of the bacterial toxins, and even infections like anthrax, in which no toxic substances are demonstrable, affect the suprarenal glands, and indeed, before suprarenal cortical extracts were available, I was able to demonstrate a distinctly favourable influence of crude suprarenal preparations on the course of infections.[2]

In a considerable number of mice infected with soil suspensions and treated with an amount of drug amply sufficient to cure an infection produced with pure culture of *Clostridium welchii*, the post-mortem findings revealed the presence of *Clostridium welchii*. This could be explained on the basis that strains of *Clostridium welchii* differ in their susceptibility to the drugs, or that mixed infection reduces the efficacy of the sulphanilamides.

Materials and Methods.

Strains of Organisms.

Four strains of *Clostridium welchii* (A) were used: one, an old laboratory strain of strong toxigenic power originally obtained from the collection of the Lister Institute and designated S 107; two strains that were recently isolated at the Women's Hospital by Miss Hildred Butler from patients suffering from *Clostridium welchii* infection (one strain, W_1, isolated from a fatal infection, and the other, W_2, from an infection which caused hardly any clinical symptoms); and a fourth strain, W_3, isolated in this institute from a sample of garden soil. Infection was produced as previously described.

Administration of Drugs.

Five equal doses of the drug were administered by stomach tube, two, four, seven, twenty-four and thirty-one hours after infection (unless otherwise stated). The antitoxic serum was injected two hours after infection and immediately after the first administration of the drug to be tested. Considerable variation in the amount of culture fatal for mice was encountered with different batches of media and different strains of organisms. However, the amount of culture necessary to kill all the infected mice was always well below the toxic dose of culture fluid freed from bacteria by repeated centrifugation. The average fatal doses of the various cultures were: S 107, 0·012 cubic centimetre; W_1, 0·05 cubic centimetre; W_2, 0·05 cubic centimetre; W_3, 0·07 cubic centimetre.

Sensitivity of Different Strains of Clostridium Welchii A to Sulphanilamide.

In parallel experiments in groups of four mice, each infected with one fatal dose of the strains of *Clostridium*

welchii, the comparative susceptibility of the four strains was determined. The doses which cured all the animals, in milligrammes per twenty-gramme mouse, are shown in Table I.

TABLE I.

Drug.	Strain of *Clostridium welchii*.			
	S 107	W_1	W_2	W_3
Sulphanilamide	5	10	5	10
"Prontosil"	5	10	15	15
"M & B 693"	5	10	10	15
"Uleron"	10	10	10	10

The chief feature of interest is that more recently isolated strains seem to be more resistant against the action of the drugs than the old laboratory strain S 107.

To test whether the passage of strains through animals and broth culture respectively would alter their susceptibility, eight passages of strain S 107 were made within three weeks through mice, the control mice of various experiments being used for this purpose. Strain W_3 was cultivated for 20 successive passages in anaerobic veal broth. No apparent change in susceptibility was found when the strains were retested with para-aminosulphanilamide and with "M & B 693". The views of Stephenson and Ross,[20] who, studying only two strains, came to the conclusion that infections with strongly toxigenic strains were less responsive to therapy with drugs, cannot be substantiated. Thus it will be noted that S 107, the most toxic strain, is the most susceptible to treatment.

Infection with Clostridium Histolyticum.

Tests that were carried out showed that sulphanilamides were completely inactive against infections with *Clostridium histolyticum*.

Treatment with Serum and Drugs.

Preliminary experiments showed that para-aminosulphanilamide and "Prontosil" were equally effective in infections with *Clostridium welchii* S 107 and with *Clostridium septicum*, and also that "M & B 693" and "Uleron", although differing in activity from the former two compounds, possessed in themselves equal intensities of action. Accordingly it was decided to test only representative members of each group, namely, sulphanilamide and "M & B 693", in conjunction with serum therapy. In all experiments the amounts of antitoxic serum administered were in themselves inadequate to inhibit the course of the induced infection. In Table II the results of varying amounts of para-aminosulphanilamide and serum on infection with *Clostridium welchii* S 107 are shown. Infection was produced with 1·5 fatal doses of a whole 24-hour broth culture, and in all instances groups of four mice were used.

It will be noted from Group II in Table II that so small an amount as 0·1 unit of antitoxic serum is able to produce an appreciable effect. Further, when two to five units of antitoxic serum are given, the amount of sulphanilamide required to combat an infection with one fatal dose can be reduced to one-half (see Groups VII and XI, Table II). When higher quantities of serum were used, irregular results were obtained, since amounts greater than five to ten units may by themselves prolong the lives of infected mice.

The same type of experiment was performed with "M & B 693" without appreciable difference in results. These experiments may be criticized on the grounds that the protective effect is produced merely by the serum neutralizing preformed toxin injected with the broth and that its inclusion therefore does not influence the infection proper. To determine the precise mode of action experiments were carried out with washed deposit from a 24-hour broth culture of *Clostridium welchii*. The culture was centrifuged and the deposit was resuspended in broth; after two further washings it was found that 0·5 cubic centimetre of the supernatant fluid, if injected intraperitoneally, was non-toxic for mice. The deposit, which contained mostly vegetative forms and occasional spores, was resuspended in 1% calcium chloride broth and then used for infection. The experimental results are shown in Table III.

TABLE II.

Group Number.	Drug Dosage. (Milligrammes per 20-gramme Mouse.	Antitoxic Serum. (Units.)	Fate of Mice.
I ..	5·0	—	2 survived. 1 died (2 days). 1 died (3 days).
II ..	5·0	0·1	All 4 survived.
III ..	2·5	0·1	2 survived. 2 died (3 days).
IV ..	—	0·1	1 died (1 day). 2 died (2 days). 1 died (3 days).
V ..	5·0	—	1 survived. 3 died (2 days).
VI ..	5·0	2·0	All 4 survived.
VII ..	2·5	2·0	3 survived. 1 died (2 days).
VIII ..	1·0	2·0	3 survived. 1 died (3 days).
IX ..	—	2·0	2 died (2 days). 2 died (3 days).
X ..	5·0	—	2 died (2 days). 1 died (3 days). 1 died (4 days).
XI ..	2·5	5·0	All 4 survived.
XII ..	1·0	5·0	3 survived. 1 died (4 days).
XIII ..	—	5·0	3 died (1 day). 1 died (2 days).

TABLE III.

"M & B 693" and Serum in Infection with Toxin-free Clostridium welchii *S 107*.[1]

Group Number.	Dose of Drug. (Milligrammes per 20-gramme Mouse.)	Anti-toxic Serum. (Units.)	Fate of Mice.
I	5·0	—	3 died (2 days). 1 died (6 days).
II	5·0	2·0	All 4 survived.
III	2·5	2·0	All 4 survived.
IV	1·0	2·0	1 survived. 1 died (1 day). 2 died (3 days).
V	—	2·0	2 died (1 day). 1 died (2 days). 1 died (3 days).

[1] Sixteen cubic centimetres of anaerobic veal broth culture of *Clostridium welchii* S 107 were centrifuged, washed and resuspended in five cubic centimetres of broth with the addition of 1% calcium chloride broth. The fatal dose for mice was 0·15 cubic centimetre; the infecting dose was 0·2 cubic centimetre.

It appears from the experimental results given above, and from other experiments with para-aminosulphanilamide which are not reported, that, apart from causing some local tissue damage which may favour the initial multiplication of the infecting organism, the small amount of toxin injected with the broth culture has no great influence on the course of the infection. Calcium chloride, as a vehicle, does not greatly interfere with the effect of the combined treatment, and the favourable results with this form of treatment will therefore, in all probability, be independent of the tissue damage which accompanies the infection. As the effect is identical when whole broth and when calcium chloride broth is used, the same results should be found in cases in which the starting point for an anaerobic infection is dead tissue, the irritation caused by a foreign body or some other similar cause.

The same experiments were then repeated with two other strains of low toxin production, and identical results were obtained.

Irrespective of the individual variations of the different strains, the amount of para-aminosulphanilamide or "M & B 693" necessary to produce complete cure in combination with serum is approximately half the amount required to cure an infection caused by one fatal dose.

The same type of experiment was performed with higher amounts of washed deposit from 24-hour cultures and corresponding to approximately five fatal doses. It was not thought necessary to make the same experiments with whole broth, because the amount of preformed toxin would have been too high.

Forty cubic centimetres of an anaerobic veal broth culture of *Clostridium welchii* S 107 and of W_2 respectively were centrifuged, washed and resuspended in 1% calcium chloride broth. The fatal doses were: S 107, 0·05 cubic centimetre; W_2, 0·05 cubic centimetre. Infection was produced with 0·25 cubic centimetre. The results obtained are shown in Table IV.

TABLE IV.

Group Number.	Dosage of "M & B 693" (Milligrammes per 20-gramme Mouse.)	Serum. (Units.)	*Clostridium welchii*. (Strain.)	Fate of Mice.
I ..	10·0	—	S 107	3 died (1 day). 1 died (3 days).
II ..	10·0	—	W_2	4 died (1 day).
III ..	10·0	0·1	S 107	1 survived. 2 died (2 days). 1 died (4 days).
IV ..	10·0	0·1	W_2	1 survived. 1 died (3 days). 2 died (4 days).
V ..	10·0	2·0	S 107	All 4 survived.
VI ..	10·0	2·0	W_2	3 survived. 1 died (4 days).
VII ..	10·0	5·0	S 107	All 4 survived.
VIII ..	10·0	5·0	W_2	All 4 survived.
IX ..	—	5·0	S 107	All 4 died (1 day).
X ..	—	5·0	W_2	All 4 died (1 day).

These results show that infections with multiples of one fatal dose can be cured with relatively small quantities of drug combined with an amount of serum that would by itself be quite ineffective.

Experiments with Clostridium Septicum.

In infection with *Clostridium septicum*, as previously reported, the action of sulphanilamide drugs was found to be much weaker than in infections with *Clostridium welchii*. Curiously enough, however, much better results were obtained with the combined treatment. The results of such experiments are shown in Table V.

TABLE V.

Group Number.	Dose of "M & B 693". (Milligrammes per 20-gramme Mouse.)	Anti-toxic Serum. (Units.)	Fate of Mice.
I	40·0	—	3 died (1 day). 1 died (2 days).
II	40·0	0·1	3 survived. 1 died (2 days).
III	20·0	0·1	3 survived. 1 died (1 day).
IV	—	0·1	4 died (1 day).
V	40·0	—	2 survived. 2 died (3 days).
VI	40·0	0·25	All 4 survived.
VII	20·0	0·25	All 4 survived.
VIII	—	0·25	2 died (1 day). 2 died (2 days).
IX	40·0	—	1 survived. 1 died (1 day). 2 died (3 days).
X	20·0	2·0	All 4 survived.
XI	10·0	2·0	All 4 survived.
XII	5·0	2·0	3 survived. 1 died (6 days).
XIII	10·0	5·0	All 4 survived.
XIV	10·0	5·0	All 4 survived.
XV	2·5	5·0	2 survived. 1 died (3 days). 1 died (4 days).
XVI	—	5·0	3 died (1 day). 1 died (3 days).

Combined treatment with "M & B 693" and antitoxic serum was given to mice infected with whole broth culture of *Clostridium septicum*. Infection was produced with 1·5 fatal doses.

As the amount of serum injected increases, the amount of drug necessary to produce complete cure becomes progressively less till approximately one-eighth of the dose which has any effect on an infection with one fatal dose is reached. The proportion between the effective dose (it will be remembered that no complete cure could be effected with sulphanilamide drugs alone in *Clostridium septicum* infections) and the curative dose combined with antitoxic serum is therefore much in favour of the *Clostridium septicum* infection as compared with the same conditions in infections with *Clostridium welchii*. This fact is the more astonishing as *Clostridium welchii* is much more susceptible to the action of sulphanilamide drugs than *Clostridium septicum*.

Levaditi *et alii*[4] observed that sulphanilamide and related compounds had a protective action against different bacterial endotoxins.[1] If such an action could be observed against toxic products of *Clostridium septicum* and not against similar products of *Clostridium welchii*, the differences in therapeutic results described above might be explained. To test this question the following investigation was carried out.

Sixty cubic centimetres of *Clostridium welchii* and *Clostridium septicum* broth cultures respectively were incubated for four hours in anaerobic veal broth, and after centrifugation and washing with broth they were each suspended in three cubic centimetres of distilled water. After they had been heated at 56° C. for thirty minutes on three consecutive days, sodium chloride was added to give a final concentration of 0·9%. It was found that the intraperitoneal injection of 0·2 cubic centimetre of this heavy sterile suspension was fatal for the majority of mice tested.

The precise details and results of the tests obtained in groups of eight mice are shown in Table VI.

TABLE VI.

Group Number.	Treatment.	Result.
I	Intraperitoneal injection of 0·2 cubic centimetre of toxin-free *Clostridium welchii* suspension. Oral administration of 10 milligrammes of para-aminosulphanilamide two and four hours afterwards.	6 mice died after 24 hours. 2 mice, although severely ill, survived.
II (Control mice.)	Same as in Group I, but no para-aminosulphanilamide given.	6 died after 24 hours. 1 died after 2 days. 1 survived.
III	Intraperitoneal injection of 0·2 cubic centimetre of toxin-free *Clostridium septicum* suspension. Oral administration of 10 milligrammes of para-aminosulphanilamide two and four hours afterwards.	2 died after 24 hours. 1 died after 3 days. 5 survived.
IV (Control mice.)	Same as in Group III, but no drug given.	5 died after 24 hours. 1 died after 2 days. 2 survived.

The same experiment was repeated several times with comparable results. It seems, therefore, that the better results with the sulphanilamide *plus* serum treatment of *Clostridium septicum* infections are due, at least partly, to a kind of double action of the sulphanilamide drugs on *Clostridium septicum*, whilst in the case of *Clostridium welchii* infections the action of the drug limits itself to the simple bacteriostatic and growth-inhibiting effect. It cannot be denied, however, that some other mechanism not investigated in these experiments may be concerned.

Experiments with Clostridium Œdematiens.

The attempt to treat fatal *Clostridium œdematiens* infections with a combination of drug and serum met with the

[1] As commonly used, the term "endotoxin" is somewhat loosely applied to toxic substances within the bacterial body, and in order to avoid confusion the term, in this article, is used in this sense.

same failure as did the treatment with drugs alone. Even if combined with serum, the sulphanilamide drugs seem to be much more toxic to mice infected with *Clostridium œdematiens* than to mice infected with other kinds of anaerobic microorganisms.

Experiments with Garden Soil.

So far all the work on the treatment of anaerobic infections with sulphanilamide drugs has been done with pure cultures. Stephenson and Ross[8] tried pure cultures mixed with sterile soil suspensions. In experiments reported previously no cure could be effected when garden soil containing all kinds of anaerobes was used for infection. However, it was found that combined therapy was efficacious when the right proportion of serum was used in combination with the sulphanilamide drugs. The results of experiments shown in Table VII illustrate this point.

Garden soil suspension was prepared as reported in the previous communication.[1] The fatal dose of soil was 0·04 gramme. One injection of mixed serum, containing 0·1 unit of *Clostridium welchii* antitoxin and 10·0 units of *Clostridium septicum* and *Clostridium œdematiens* antitoxin respectively was given. Groups of four mice were used.

TABLE VII.

Group Number.	Drug.	Dose. (Milligrammes per 20-gramme Mouse.)	Anti-toxic Serum.	Fate of Mice.
I ..	"M & B 693"	20	+	2 survived. 1 died (5 days). 1 died (6 days).
II ..	"M & B 693"	10	+	2 survived. 2 died (5 days).
III ..	"M & B 693"	5	+	2 survived. 1 died (5 days). 1 died (6 days).
IV ..	Sulphanilamide.	10	+	1 died (3 days). 1 died (5 days). 2 died (6 days).
V ..	Sulphanilamide.	5	+	2 died (4 days). 2 died (5 days).
VI ..	—	—	+	2 died (2 days). 2 died (3 days).
VII ..	"M & B 693"	20	—	1 died (2 days). 1 died (3 days). 2 died (4 days).

The post-mortem findings were not unusual, so it is hardly necessary to report them. Mice dying after infection with soil had, as a rule, a mixture of *Clostridium œdematiens* and *Clostridium septicum*, together with cocci or coliform organisms, in their heart blood and in the parenchymatous organs. Occasionally no microorganisms could be isolated. Two mice of the experiment reported above, one of them treated with ten milligrammes of "M & B 693" in combination with serum and one of the controls treated with serum alone, showed definite symptoms of tetanus, and another yielded *Clostridium tetani* in cultures from the heart blood.

It seems from the results of this experiment that combined treatment, especially with "M & B 693" in preference to para-aminosulphanilamide, has a favourable effect on infections with natural soil. In a further series of experiments a more intensive form of treatment was adopted. This consisted in repeated administration of serum and a prolongation of the treatment with drugs to the fourth day after infection.

Infection was, as in the previous experiment, produced with 0·04 gramme of garden soil. Drug treatment was given two, four and seven hours after infection and then twice daily up to the fourth day. Two hours after infection a mixed antitoxic serum, containing 0·1 unit of *Clostridium welchii*, 10·0 units of *Clostridium œdematiens* and 10·0 units of *Clostridium septicum*, was given. This latter treatment was repeated daily up to the fourth day. The results obtained are shown in Table VIII.

It was observed from this and similar experiments, not reported, that all the deaths were due to some cause other

TABLE VIII.

Group Number.	"M & B 693". (Milligrammes per 20-gramme Mouse.)	Serum.	Fate of Mice.
I ..	30	+	3 survived. 1 died from extraneous causes.
II ..	20	+	3 survived. 1 died in 4 days from tetanus.
III ..	10	+	3 survived. 1 died on 4th day form tetanus.
IV ..	30	—	2 died in 3 days. 2 died in 4 days.
V ..	—	+	1 died in 2 days. 2 died in 3 days. 1 died on 3rd day from tetanus.

than infection with the organisms of gas gangrene. Owing to the difficulty of standardizing a soil suspension, it occasionally happens that mice die even after intensive treatment for gas gangrene infection.

Most of the mice used for these experiments developed local swellings, which ulcerated on the second or third day after infection. The treatment cannot, therefore, cure the local infection caused by the injection of the soil. No such local abscess formation was observed when one single fatal dose of broth culture or suspension of bacteria was used for infection. In the abscesses formed after soil infection numerous kinds of bacteria were observed, and occasionally the gas gangrene organisms. However, considering the numbers of bacteria, the local sores seem to be caused more by irritation of the soil particles and by the ordinary soil flora than by the surviving anaerobes.

Naturally, in dealing with gas gangrene infections in the human being, it is not always possible to commence therapy within a short time after infection. A few experiments that were carried out on mice showed that, if treatment was delayed for four to five hours after infection, the possibility of cure was greatly lessened.

Non-Specific Increase of Resistance.

In a rather extensive series of some earlier experiments[2] different methods of increasing the resistance of animals against infections of low virulence were tried. Special stress was laid on the action of different substances isolated from tissues, and good results were obtained with crude preparations from adrenals, liver or crude urinary extracts containing sterols.

It was thought worth while to test the life-preserving substances of the suprarenals against the toxin of *Clostridium welchii*. Further studies of different hormones and active substances of endocrine organs are planned.

Action of Desoxycorticosterone Acetate on Mice Injected with Clostridium welchii Toxin.

Two types of experiments were performed, one to show the action of the hormone against an immediately fatal dose of *Clostridium welchii* toxin, and the other to show its influence on a chronic intoxication with the same toxin.

Eight mice were given two daily subcutaneous injections of desoxycorticosterone (0·1 milligramme in 0·1 cubic centimetre of sesame oil). On the second day of this treatment 0·05 cubic centimetre of crude *Clostridium welchii* toxin (one fatal dose) was injected intraperitoneally. Eight mice, injected with toxin and pure sesame oil, served as controls. The following results were obtained.

Mice Treated with Desoxycorticosterone.	Control Mice.
6 survived	1 survived
2 died (1 day)	3 died (1 day)
	2 died (2 days)
	1 died (3 days)

In another experiment six mice were given two daily injections of desoxycorticosterone before the administration of *Clostridium welchii* toxin. One-third of a fatal dose of the latter was then given on five successive days and the administration of desoxycorticosterone was continued for this period. All the mice so treated survived, whilst in the

control group injected with toxin and sesame oil, two survived, one died on the fourth day, one on the sixth day and two on the seventh day.

The increase in resistance of mice treated with desoxycorticosterone is pronounced in both types of experiments, and further research on the optimal conditions for this kind of treatment and on the action of other similar compounds would probably give some interesting results.

Summary and Conclusions.

The most outstanding information gained by the experiments described in this paper is the striking effect of antitoxic serum on the amount of sulphanilamide drug required to cure infections with *Clostridium welchii* and *Clostridium septicum*. The fact that even small quantities of antitoxic serum enable the drug dosage to be materially decreased suggests that a similar form of therapy might be of considerable value in treating gas gangrene infections in the human being.

The "anti-endotoxic" action observed against *Clostridium septicum* is of interest; but it is doubtful whether any practical importance can be attached to this phenomenon. Unless drugs primarily possess *in vivo* a definite bacteriostatic action, any slight "anti-endotoxic" properties cannot be expected to give good therapeutic results.

Finally, the non-specific effect of suprarenal cortical hormones in increasing resistance has been confirmed with desoxycorticosterone.

Acknowledgements.

I am indebted to the Australian representative of "Ciba" for supplies of desoxycorticosterone, to the Lister Institute, London, for the samples of antitoxic serum used in the experiments, and to the Commonwealth Serum Laboratories, Melbourne, for strains of *Clostridium septicum* and *Clostridium œdematiens*.

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ANÆSTHESIA AND SHOCK.

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SHOCK is essentially a state of tissue anoxia due to the impairment or failure of peripheral circulatory efficiency. The immediate cause is a widespread capillary dilatation, with stasis of the contained blood (stagnant anoxia). Secondarily there are impairment of tissue nutrition and retention of metabolites (carbon dioxide, lactic acid *et cetera*), resulting in tissue acidosis. Capillary permeability is increased because of either oxygen deficiency or toxic influences (ether *et cetera*), and the plasma constituents of the blood escape into the tissue spaces.

The consequent decrease in effective blood volume is met by an increased adrenaline output and increased sympathetic activity.(1) The result is a peripheral vasoconstriction, both of arteries and of veins, designed to conserve blood for vital processes, which aggravates the capillary stasis and the state of stagnant anoxia generally. Cardiac efficiency is impaired, partly because of the reduced venous return, but also because of the concentrated state of the blood. The sympathetic hyperactivity accounts for most of the signs of shock—pallor, cold clammy skin, sweating, tachycardia, dilatation of the pupil and hyperglycæmia.

Classification of Factors.

The factors involved in the production of shock are the following:

(i) Reflex: from trauma (including surgery), cold, exposure, burns *et cetera*.

(ii) Toxic (including therapeusis): in sepsis, from trauma, burns, poisoning, injudicious and excessive use of sedatives (morphine, barbiturates *et cetera*) and with anæsthetics.

(iii) Paralytic: in spinal analgesia, traumatic paralysis, and following deep and prolonged narcosis or anæsthesia, from widespread loss and delayed return of muscle tone.

(iv) Psychic: from fear *et cetera*.

(v) Anæmic: from severe blood loss and in profound anæmias.

These factors may operate singly or in any variety of combination.

All anæsthetics in varying degree may predispose to or aggravate shock because of their toxic properties. Each agent, however, has peculiar features, which may be utilized to combat some of the other factors involved. For instance, local and spinal analgesia will offset reflex factors while minimizing toxic factors (unless premedication is excessive). Spinal analgesia aggravates paralytic factors in proportion to its height, and is of significance in relation to anæmic factors. Strictly "low" spinal analgesia, however, is an eminently safe method in even the most serious cases. The significant feature is the degree and extent of vasomotor and somatic paralysis induced.

While both chloroform and ether combat reflex factors, they aggravate toxic and paralytic factors in proportion to the depth and duration of the anæsthesia induced by them. Sedatives and narcotics relieve the psychic factors, but, especially if used in excessive amounts, may aggravate the toxic factors. In profound anæsthesia with any agent paralytic factors intrude, and recovery from them may be delayed even for days.(2)

Chloroform and ether increase capillary permeability and so favour transudation from the blood to the tissues.(3) Chloroform also at an early stage impairs myocardial efficiency. Both cause an increased secretion of adrenaline,(1) probably in an indirect manner, their toxicity inducing a progressive impairment of circulatory efficiency which leads immediately to the compensatory sympathetic response.

Any preexisting toxæmia or superadded reflex or other factor either aggravates or is aggravated by the toxic effects of these drugs. It is fallacious to regard ether as a stimulant, the apparent early beneficial effect of its administration being essentially a protective reaction. Any anoxæmia occurring in the course of the administration of these drugs greatly increases their toxicity.

Nitrous oxide, when given with adequate quantities of oxygen (not less than 15% by volume) has no ill effect on capillary permeability. Its narcotic properties are weak, so that it may possibly not combat reflex factors adequately. Suitable premedication greatly facilitates its safe administration and reduces the need for oxygen restriction in the production of satisfactory results. If pronounced or severe anoxæmia is purposely developed in its administration, and especially if ether has been added to deepen the anæsthesia, grave circulatory effects are soon manifest. Whenever chloroform, ether, vinyl ether or cyclopropane is used to reinforce the action of nitrous oxide, adequate oxygen (at least 25% by volume) must be provided.

Ethylene, not very commonly used, has a slightly greater potency than nitrous oxide, so that with it more oxygen may be used in the production of comparable effects. Like nitrous oxide, its toxicity is low; capillary permeability is not disturbed; and recovery from its effects is rapid, so that prolonged muscular hypotonicity does not result. The safe and satisfactory administration of both nitrous oxide and ethylene requires good apparatus, judgement, knowledge and experience. These gases have their strict limitations, and to consider them suitable for the whole range of surgery is unwarrantable.

Cyclopropane, in common with the other anæsthetic gases, does not induce sympathetic hyperactivity. It rather favours the development of parasympathetic reactions,(4) which at times may be embarrassing. These

reactions, however, are easily controlled in most cases, especially with the help of atropine administered beforehand. Cyclopropane therefore is an excellent agent for use in cases of impending and established shock, because it does not aggravate the operation of other adverse factors. Its potency is adequate for all operations other than those performed in the upper part of the abdomen. As it is given by the closed carbon dioxide absorption method, moisture and heat are conserved for the patient. It has very slight, if any, action on capillary permeability, and although recovery from its effects is less rapid than from those of nitrous oxide or ethylene, general muscular tone is soon regained. Unfortunately its administration is often associated with increased bleeding, especially in the initial stages of the operation. Such bleeding is rarely severe and may to a large extent be prevented by the preliminary administration of ephedrine sulphate, half to three-quarters of a grain given hypodermically. A preexisting hypovitaminosis is possibly of significance in this connexion.[5]

The potency of cyclopropane is such that concentrations of oxygen ranging up to 75% or 80% by volume are possible in its administration. Such a mixture of cyclopropane and oxygen forms an excellent basis for reinforcement by ether; the advantages of each narcotic drug are thus utilized and the disadvantages largely avoided or cancelled out, because of the antagonistic actions on the autonomic nervous system. It must be mentioned here that, although it is possible and often advantageous to use with cyclopropane or ether the high oxygen concentrations indicated above, in practice as nearly normal a quota of nitrogen as possible should be retained in the anæsthetic mixture in order to guard against atelectasis.[6] In addition, excessive oxygen concentrations are said to favour the development of a tissue acidosis. Special apparatus and a considerable order of skill and knowledge are required for the safe and satisfactory use of cyclopropane.

Long-acting drugs like phenobarbital, "Amytal" and "Nembutal" should never be used in more than mildly hypnotic dosages in states of impending or established shock. Their use for basal narcosis in such circumstances is absolutely contraindicated. The same applies to bromethol ("Avertin"), which, although quite unrelated to the barbiturates in chemical structure, acts similarly.

The short-acting barbiturates, "Pentothal Sodium" and soluble hexobarbitone ("Evipan Sodium"), must be used with great care in states of shock. These barbiturates depress sympathetic activity and so cause a fall of blood pressure which is proportional in degree to their dosage, and in duration to the rate of their elimination by the liver. The administration of even a small dose of these drugs in states of severe circulatory depression may induce the most profound collapse. Their elimination may be greatly delayed if the condition of tissue and visceral anoxia, already established, is aggravated by the additional depression they will cause. Further, the autonomic imbalance induced by them may lead to the development of troublesome parasympathetic manifestations (laryngospasm *et cetera*).[7] These drugs are powerful respiratory depressants, a point that must be borne in mind if large doses of other sedatives have been given beforehand.

Here again knowledge and judgement and the ready availability of an oxygen supply are of paramount importance. The efficient use of oxygen as a supplement during the administration of these drugs greatly increases their safety and utility and permits of their use in cases otherwise quite unsuitable.[8] In such circumstances their toxicity is remarkably low; capillary permeability is unaffected; sympathetic hyperactivity does not develop; and if care and restraint in the matter of dosage are exercised, recovery need not be unduly delayed. They are excellent for induction preliminary to nitrous oxide anæsthesia, allowing of good control without suboxygenation.

As has been suggested already, spinal analgesia is contraindicated in severe shock, and must be used with great care in cases of impending or slight shock. The segmental level to which the analgesia must reach is the deciding factor: the higher it goes, the greater the vasomotor and somatic paralysis and so the capillary stagnation. Ephedrine, unless given in large and repeated doses, which themselves will produce undesirable reactions, does not sustain the blood pressure, probably because nervous impulses can no longer reach the affected nerve endings. The recently introduced drug "Neo-Synephrin Hydrochloride" is of exceptional value in sustaining the blood pressure during spinal analgesia.[9][10] Used in a 1% solution, in doses of from 0·25 to 0·5 cubic centimetre given hypodermically, repeated as required, it will not only prevent the fall of blood pressure but will correct any fall that has occurred, however grave. Evidently the action is peripheral and independent of nervous impulses. It is not too much to say that this drug will enlarge the scope and safety of spinal analgesia enormously. Nevertheless, despite this safeguard, the utmost care must be exercised in the selection of cases for spinal analgesia, and the possibility of overdosage with the restorative drug must not be forgotten.

Some Observations on the Prevention and Treatment of Shock.

The considerations affecting the prevention of shock, so far as the anæsthetist is concerned, have been sufficiently indicated already; so also have many of those relating to the established condition, such as the choice of anæsthetic and the prevention of anoxæmia.

Obviously, severe hæmorrhagic losses, especially if sudden, must be made good. But whole blood is sometimes worse than useless when blood loss has not been great and when the shock is of reflex, toxic, paralytic or psychic origin. Admittedly the plasma content of whole blood will be beneficial, but its red corpuscles may merely aggravate the existing and increasing blood concentration. In such circumstances the administration of 0·9% saline solution or 5% glucose solution will often produce a remarkable, if temporary, improvement, which whole blood may not do. If plasma proteins could be added to such solutions the results should be ideal, provided that the adverse conditions (reflex, toxic *et cetera*) affecting peripheral stasis and capillary permeability were minimized or removed. Arresting work on this aspect of the problem has recently been reported, and the conclusions reached are very promising.[11]

The practice of adding pressor substances (adrenaline, "Neo-Synephrin Hydrochloride" *et cetera*) to fluids used for venoclysis is questionable. Already, in established shock, the pressor mechanisms of the body are in full and excessive play. It seems unwise to run the risk of aggravating the vicious circle of shock in this way. The emergency use of stimulants is, of course, not condemned; with their timely help the patient may be tided over a crisis, so that it becomes possible to institute and apply more effective and more rational remedies. Their use is especially indicated in spinal analgesia, when the paralytic circulatory disturbance is only temporary and often is not seriously aggravated by other ætiological factors.

The excessive use of external heat in shock seems irrational. The heat-regulating mechanism of patients suffering from shock is grossly disturbed, and the contracted state of the skin vessels impairs the normal means of heat loss. The body in such circumstances makes great efforts to dissipate heat by means of profuse sweating; this results in great fluid loss and general dehydration, increased blood concentration, and an aggravation of the vicious circle. Contrary to common belief, it is possible that the internal temperature of the body in shock is high, and not low. Admittedly, metabolism and heat production may be seriously depressed by tissue anoxia and tissue malnutrition. Nevertheless, the spectacle of a pale, sweating, restless patient, gasping for air and throwing off blankets and hot bags until finally exhausted or made quiescent with morphine, needs serious consideration.

Another possibility is the development of hyperchloræmia from the excessive use of saline infusions.[12] In view of their transient beneficial effect it would seem best to employ them only to combat the initial emergency, reverting then to plain water by mouth or *per rectum* for subsequent fluid replacement.

Established shock may easily be aggravated by any rough handling of the patient, especially during trans-

portation. Rapid changes of posture, such as occur when the patient is moved from table to trolly and from trolly to bed, may induce profound collapse, as also may changes of posture during the operation.[12] If the state of shock is serious, no movement whatever should be allowed until improvement has occurred. During recovery from the anæsthetic the lateral posture offers many advantages,[6] and there is evidence that it has a beneficial influence on the blood pressure.

Conclusions.

1. Anæsthetics are important factors in predisposing to and aggravating shock.

2. The abuse of sedatives and narcotics has similar results.

3. A careful estimate of the patient's probable reaction to narcosis and anæsthesia is essential in cases of impending or established shock.

4. A careful selection and application of agents and methods should be made.

5. The judicious combination of various agents offers many advantages.

6. The gaseous anæsthetics, and especially cyclopropane, are of great value in shock, provided that oxygen deprivation is avoided.

7. Efficient local analgesia, with light general anæsthesia induced preferably with one of the gaseous agents, will often give good results.

8. In general, spinal analgesia and intravenously induced anæsthesia are unsuitable in shock.

9. The use of chloroform should be prohibited and that of ether minimized in states of impending or established shock.

10. Surgical procedures should be limited to the immediate necessities of the case.

11. Rationalization of the treatment of shock is desirable.

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OPTICAL CONVERGENCE AND STEREOPSIS IN RELATION TO PERSPECTIVE.

By JOHN MAUDE,
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BEFORE submitting the results of examinations carried out on about 100 people of various ages with a view to establishing a relationship between orthoptics and artistic merit, I should like to call attention to the evolution and significance of stereoscopic vision and its influence on human behaviour.

Evolution of Stereoscopic Vision.

As we ascend the phylogenetic scale we find that there is a gradual loss of panoramic vision, the optical axes tending to converge more and more so that the overlap of the visual fields in front increases and we arrive finally at reciprocal and corresponding binocular vision. Certain concurrent changes take place in the retina. Increasing attention to detail and small objects, the picking up, picking out and picking off of the monkeys who learn to feed on fruits, nuts and small insects, brings about improving visual efficiency and gradual recession of the olfactory system from a dominating position in the cerebrum. Inquisitiveness, demanding more and more accurate central vision, results in the development of the maculæ, which in the lower scale of animals are represented by a mere crowding of the retinal cells, but ultimately become arranged in the specialized manner seen in the human retina. The change from the lower scale retina to the human retina may be regarded as a change from protopathic to epicritic sensibility. Thus for every loss in width of panorama there is an increase in the overlap of fields and greater accuracy of central vision. The two retinæ, the eyes being directed forwards, become stimulated at corresponding points, and the points of greatest sensibility and correspondence are the maculæ, which are the instruments that confer on vision greater powers of resolution and discrimination. Binocular central vision allows us to focus our attention on an object in our immediate environment and to disregard the otherwise confusing diplopia in our peripheral or panoramic vision.

When the images from the eyes reach consciousness and fusion takes place, unless, owing to the slightly different angle at which the eyes view the object, the central vision of each eye is sufficiently accurate and keen to detect minute differences in each image, only two-dimensional visual sense results. Highly developed macular vision makes us aware of minute differences in the components of the fused images and three-dimensional visual sense, or stereoscopic vision, is established. Binocular stereoscopic vision calls for exquisite accuracy in adjustment of the two eyes, so that they can be directed to the point of gaze with perfect coordination of accommodation and movement. If binocular vision is to be of value it must be able to accept a prolonged stimulus and be served by eyes which cannot only be directed forwards in conjugation and focused on an object, but also be held in static poise. This accurate coordination of accommodation and conjugate eye movements is in the province of the proprioceptive nervous system.

In *Nature* of May, 1930, the late Professor Sir Grafton Elliot Smith emphasized the importance of the proprioceptive nervous system. He showed how the perfection of vision had been reached in stereopsis, which came about by the complex process of the integration of vision and muscular skill. The participation of the whole organism in any act of skill contributes to the development of the intricate coordination involved in the conjugate movements of the eyes, which is essential for the cultivation of binocular vision, the development of the maculæ and foveæ, and the ability to see stereoscopically and so add third dimension to spatial discrimination.

The associated evolution of acute central form sense, accommodation and convergence, is of considerable interest when we consider the intimate dependence of each one upon the others for purposes of stereoscopic vision. If one of these three faculties becomes seriously

interfered with, so that the balance between them is disturbed, then the recently acquired capacity of fusing the superimposed images seen with the two eyes is given up and one eye only is employed for fixation.

Grades of Binocular Vision.

A person with one seeing eye lacks spontaneous perspective, but can be taught rules, and with practice may become a good draughtsman. He may become adept in the use of rule and compass and adhere rigidly to prescription; but once he has to make a freehand sketch he will fail. But for parallax his is a world of two dimensions, and we may compare him with the person who makes a study of harmony without a sense of rhythm or tune.

In the same category with the monocular people are placed those in whom good vision exists in each eye without binocular fusion. This is found in alternating strabismus, the vision of one or other eye being suppressed alternatively, and also in intermittent divergent strabismus in a less degree. In the latter, fusion and even stereoscopic vision are present; but when the eye diverges there is no diplopia, suppression of vision of the diverging eye takes place and the patient becomes monocular.

In certain phorias strong stereoscopic vision prevents the development of a frank squint. If these people are carefully examined it will be found that they are often monocular for close work; the effort of maintaining binocular vision is too great and the vision of one eye becomes suppressed while the axes remain parallel. This is distinct from intermittent divergent squint, wherein the axes diverge beyond the parallel.

Another class of people have binocular vision with fusion, but no stereoscopic vision until the axes become well converged; for this I have suggested the term "latent stereopsis". An explanation of the phenomenon that in some cases stereoscopic vision is absent when the axes are parallel but present when the axes are converged to 10° or 15° would be welcome.

Emerging from the preceding class are those who have binocular vision, fusion with stereopsis for parallel vision or a small angle of convergence, but able to maintain convergence to beyond 25°, and the final class who have strong instantaneous stereopsis with parallel vision and are able to converge to and hold convergence from 35° up to 50°. This latter class could be described as orthoptically perfect.

Method of Examination.

The Pugh "Orthoptoscope" (Hamblins, London) was used in these investigations. Like the "Synoptophore", it is an elaborate amblyoscope by which separate images can be presented to each eye simultaneously. The images, being usually illuminated pictures, are placed in cylinders, each of which is capable of being rotated about a common axis. The subject undergoing examination looks into the eye-pieces. When the cylinders are set at 0° the visual axes are parallel; when they are set at an angle, if the two pictures are superimposed, the measure of the angle of the cylinders is the measure of the angle of the visual axes.

With the permission of the Department of Public Instruction and the help of Mr. H. V. Stuckey, Assistant Supervisor of Art, I was able to examine teachers and pupils undergoing art training. The records were tabulated under various headings—name, age, vision, convergence to finger, voluntary convergence, readings on the "Orthoptoscope", and remarks. In connexion with the testing of ability to sketch, Mr. Stuckey has grouped the students' work as follows:

S. (superior): Students who have shown native ability from the beginning, overcoming most difficulties in perspective and sketching correctly.
Av.+ (above average): Those who show great improvement after a few lessons and some practice.
Av. (average): Those who rely mostly on prescription and formula.
Av.- (slightly below average): Those who are confused and incorrect at times, even though they have had lessons.
W. (weak): Those who never do any good with sketching; failures from the start and remain as such.

The following definition of perspective is taken from R. G. Hutton's "Perspective for Art Students, 1910":

The regular diminution of receding parts is called the perspective of the objects, and we draw in perspective when we pay due attention to this diminution. The laws of perspective affect all objects, no matter how varied or curious their form, but the influences of those laws are most evident when the objects are of severe geometrical shapes, such as railway tracks, straight roads, buildings and the like.

Tabulation of Results.

Tables are given below. In Table I artistic ability can be compared with the power of voluntary convergence; in Table II orthoptoscopic measurements of convergence can be compared with artistic ability; and Table III is a supplement to Table II, in that those whose ability depends on formula and prescription as a result of training have been eliminated.

TABLE I.
Voluntary Convergence and Ability in Perspective.

Voluntary Convergence.	Group.				
	S.	Av.+	Av.	Av.−	W.
+++	4	2	2	3	1
++	4	2	8	5	4
+	2	6	5	6	0
Nil	0	4	5	14	5

TABLE II.
Convergence Measured with the "Orthoptoscope" (by means of Stereoscopic Slides) and Ability in Perspective.

Convergence in Degrees.	Ability in Perspective.				
	S.	Av.+	Av.	Av.−	W.
35 to 50 ..	10	5	9 (3)	0	1 (1)
30 to 35 ..	1	2	4 (1)	3 (1)	0
25 to 30 ..	0	1 (1)	1	7 (2)	2 (1)
20 to 25 ..	0	3 (2)	2 (1)	11	5
0 to 20 ..	0	1 (1)	3 (2)	6 (3)	3

An attempt was made to tabulate measurements of stereoscopic vision, but the difficulty of finding a satisfactory basis of recording was even greater than in voluntary convergence. A study of the results brings out the following general facts. All those in the "superior" class have instantaneous stereoscopic vision, which is intensified by convergence. There were a few in the "above average" group and an increasing percentage as the lower groups were reached in whom a convergence of 8° to 14° was necessary before they became aware of stereopsis. This is what I have termed "latent stereopsis". There were three who had no stereoscopic vision at any angle and three who stated that it wavered. For research along these lines a series of slides is required, graded so that they begin with a very small difference in each picture, thus requiring strong stereoscopic vision for its detection, and lead up to a final pair wherein the differences are so great that only weak stereoscopic vision is called upon. I was impressed by the more vivid and alert personalities of those in the higher groups. It is possible that an explanation of this lies in the fact that proprioceptive impulses from the eyes link the process of spatial appreciation with the personality of the individual. The integration of his personality and the complex social structure of his environment determine his behaviour.

The artistic ability can be compared with the power of voluntary convergence. It must be emphasized that the testing of voluntary convergence was difficult and the records are only approximate. Use was made of "+" signs as a measure of observation. A relationship is shown to exist between voluntary convergence and artistic merit, because the majority of those who have the more superior artistic merit have a fair degree of voluntary convergence, whereas the majority of those who have mediocre artistic merit have poor or no voluntary convergence.

Tables II and III show the results of orthoptic measurements, which, being more accurate and definite, are more conclusive. With few exceptions, due chiefly to training, artistic merit follows orthoptic merit. Where perspective is weak, orthoptic measurements are low; where perspective is strong, orthoptic measurements are high.

The figures in parentheses denote the number of those who, lacking spontaneous perspective, draw mainly to formula as a result of training. If these are removed from the table the results are more conclusive, as set out in Table III.

TABLE III.

Convergence in Degrees.	Ability in Perspective.				
	S.	Av.+	Av.	Av.−	W.
35 to 50 ..	10	5	6	0	0
30 to 35 ..	1	2	3	2	0
25 to 30 ..	0	0	1	5	1
20 to 25 ..	0	1	1	11	5
0 to 20 ..	0	0	1	3	3

General Comment.

The investigations I have carried out have a useful application. In the majority of persons lacking spontaneous perspective, training in perspective results in improved but essentially prescriptive drawing, which never reaches the superior class. This is emphasized by the comparison of the second and third tables. It would be interesting to discover by how much orthoptic training would improve appreciation of perspective; from my limited experience I believe some improvement would be achieved. Some patients suffering from exophoria and weak latent stereoscopic vision, during training, rapidly develop strong stereoscopic vision; but they usually need at least 10° of convergence for it to be fully appreciated, parallel vision remaining astereoscopic.

Fourteen children were examined at the Haberfield Demonstration School through the courtesy of Miss MacKenzie. The results were similar to those of the adults, and I concluded that their ability to sketch varied with the binocular equipment. Further work along these lines is necessary. It would be well for teachers to take into consideration my opinion that pupils of all ages who seem dull and stupid at drawing in perspective are more likely to be suffering from a defective binocular apparatus than a defective mentality.

ARTIFICIAL HEARING AIDS.[1]

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UNTIL the last decade, when the great advances in sound reproduction, amplification and recording associated with telephone engineering and broadcasting made the accurate study of deafness possible, there was no doubt that the ear, in proportion to its significance, was the most neglected organ of the body. Even the obvious artificial aid, the common ear-trumpet, was made to such an ugly and ludicrous pattern that the wearer felt himself an object of pity mixed with ridicule. Advances are being made today with great rapidity, and although perfection is far from being attained, hearing aids are being manufactured which enable large numbers of deaf persons comfortably to carry on their daily life, which previously had been a nightmare of strain and humiliation.

All hearing aids consist of three parts: (i) the sound collector, (ii) the amplifier and (iii) the ear-piece. The sound which enters the collector and the sound which issues from the ear-piece may differ in the following ways:

1 There may be a difference in intensity between the primary and secondary sound. An ideal condition is one in which the difference in intensity is equal throughout the whole frequency range; but if some frequencies are amplified at different intensities from others, then the resultant sound is said to be distorted.

2. There may be a difference in frequency between the primary and secondary sound. This implies that some of the primary sound frequencies are transformed in the hearing aid so that the original frequency is wholly or partly lacking, being compensated by frequencies at other places. A difference of this kind indicates a high degree of distortion.

3. Sounds occur in the apparatus itself.

How do the different hearing aids stand in relation to the above-mentioned factors?

The simple aid is characterized by practically uniform, though weak, amplification throughout the whole auditory range. The degree of amplification depends partly on the area of the sound collector and partly on the shape of the conducting tube. It has been found that a gently sweeping curve with gradual uniform diminution of the passage concentrates the sound best. Each instrument will have a resonance area of its own where the amplification will be greatest. The less the volume of air in the aid, the higher will be its resonance area. As the only practical use of an ear trumpet is in slight senile deafness, in which there is loss of high frequencies, this means that an instrument with a high resonance area should be used. This unfortunately leads to the choice of a small ear trumpet, whose amplification is seriously reduced by its size. Considerable ingenuity has been shown by manufacturers of these aids in the shape of "auricles", "cornets" *et cetera*; but their smallness and pseudo-invisibility limit their use to cases of slight presbyacusis. Prices range from four to ten guineas.

The speaking tube is another simple aid, in which, although the amplification is negligible, there is the advantage that the patient can gain added elucidation by watching the speaker's lips while hearing the voice in contact with the concha. Tubes are made from three to five feet long, and are priced from four to eleven guineas. It is obvious that tiny tubes inserted in the external meatus are valueless as sound collectors. They may be of benefit mechanically in a collapsed, excessively hairy or stenosed meatus.

Electrical hearing aids comprise a microphone for sound collection, a telephone receiver for distribution, and an amplifying unit in between. There are two types: (i) carbon apparatus or simple microtelephone, (ii) valve amplifier. The carbon apparatus consists of a thin membrane on top of a number of easily movable carbon balls. The sound waves set the membrane in vibration, causing changes of resistance between the membrane and the carbon, varying the power in the circuit and causing corresponding movements in the membrane of the receiver. An improvement of the ordinary granular carbon microphone is the carbon dust microphone, which does not give rise to scratching noises (caused by the rattling of the carbon balls), but at the same time cuts down some of the amplification. Receivers can be as large as the commercial telephone receiver, or small button-like objects just fitting in the ear, or bone-conductors pressed against the mastoid process. The sound intensity of the various receivers is approximately in proportion to their size and weight. Physicists have found that carbon aids give hardly any response to frequencies above 3,000 cycles per second, or to sound intensities corresponding to conversation at a distance of more than eight to ten metres. Therefore mechanical noise and strong sound intensities are greatly amplified, and human speech and slight sounds are weakly amplified. Noise like the closing of a door or stamping on the floor will sound like a cannonade. These aids are thus of greatest benefit to the person with obstructive deafness and loss of hearing to low tones, whose disease is mild or in an early stage before perceptive deafness begins to be demonstrable. The bone conductor has proved a real boon in such cases, for although the amplification range of the bone conductor is less than that of an air receiver on account of the damping effect of the soft tissues over the mastoid, these patients hear the high tones through the external meatus while the lower tones are amplified for them by the bone conductor.

[1] Read at a meeting of the Oto-Rhino-Laryngological Society of New South Wales (British Medical Association) on May 16, 1940.

The second group of electrical aids to be considered is the valve amplifier. The usual microphone, of piezo-electrical type, works free from distortion throughout the whole range of audibility—that is, from 25 to 16,000 cycles per second. Carbon microphones work under the same disadvantages as in the microphone-telephone set, but are sometimes recommended for the tropics, where crystal microphones are apt to be affected by heat and moisture. The piezo-electric microphone contains a Rochelle salt crystal, and the valves are heated by pocket lamp batteries, generally of four and a half volts. For anode tension a battery of 30 to 45 volts is used. A potentiometer attached to the grid of the last valve serves best as an intensity regulator. Sometimes there is a device for selective amplification, in the form of condensers over the microphone or receiver terminals. By this means the high frequency areas can be cut short at the frequency desired, although volume is sacrificed by this procedure. Crystal ear-pieces have been made, but they get out of order in hot moist conditions, such as obtain when they are clamped on the ear, and they are not recommended. Background noise is present and is more pronounced in very sensitive instruments. If the amplification of a hearing aid and the distance between the speaker and the microphone are reduced, the background noise is lessened. This is impracticable in an auditorium, and the amplification requires very delicate adjustment to obtain good results in such circumstances.

"Feed-back", a whistling noise produced by interference, the sound waves arriving via the microphone meeting those entering the receiver via the air, is common to all electrical instruments, including the ordinary commercial telephone. This is combated by means of a vulcanite ear-piece moulded from a plaster cast of the entrance to the meatus. This prevents sound from entering the receiver by air, so that only the amplified sound arriving via the microphone is heard by the patient. However, as has been previously stated, the volume is less than as if a large receiver were being used, and in some cases a dermatitis is set up by the pressure of the ear-piece in the meatus.

The valve amplifier satisfies all requirements in a hearing aid as far as intensity and freedom from distortion are concerned. It is large and heavy compared with the carbon apparatus, and is more costly to run. Prices of these machines range from 25 to 45 guineas. "B" batteries cost 10s. and last from three to six months. Midget "B" batteries may be obtained at one and a half times the cost of the usual "B" batteries, but have only half the life. Low-tension batteries last an average of thirty hours, provided a number are in use, allowing adequate rest for recuperation, and they cost two shillings. In some models torch batteries may be used.

No charge is made by most firms for trial over a period of one week, on production of satisfactory references. This has evidently been forced on them by competition, and I think it would fairer to them and to the public if they made a hiring charge to cover wear and tear on batteries *et cetera*. It is advisable to try several makes before deciding on one, and a definite hiring charge would prevent patients from feeling under an obligation and make them better able to resist the super-salesman.

Valve amplifiers of great power may be made to work from electric power mains, and are of value to business executives and for individual amplification of church services *et cetera*.

Group aids in the treatment of children with hearing defects are also modifications of valve amplification machines.

Patients suffering from any type of deafness will, on suddenly receiving amplified speech, become very confused. Reeducation in the perception of sounds and speech will then be needed, and the patient should be persuaded to persevere with his aid, being helped in lessons in dictation and practice among the family circle.

Discussion.

Having summarized the types of hearing aids and their characteristics, I wish to discuss the results obtained with different types of deafness. If the problem was just one of amplification alone the solution would be fairly easy, for, although the instrument must be small and portable, and must collect sounds from in front, behind and from each side, and at the same time make amplification uniform throughout the entire frequency range, these technical difficulties are not insuperable and are in fact being overcome by research in physics and engineering. A person with normal hearing using a modern valve amplifying apparatus is astounded at the clear amplification of sounds from all points with a minimum of background noise, and wonders why all deaf people who can afford it do not immediately purchase one.

Why do deaf patients not obtain immediate benefit in many cases? First, there is the confusion phenomenon referred to in the previous paragraph. Secondly, when the intensity of a sound reaches a certain point the sensation it causes in the cochlea passes from one of hearing to one of pain. In 1937 the Committee upon the Physiology of Hearing of the Medical Research Council of the Privy Council conducted experiments on normal and deaf patients which showed that the latter were less susceptible to auditory fatigue induced by continuously maintained loud sound than were the normal patients. Further experiments showed that the threshold of pain is an average upper limit of intensity holding good for normal and deaf listeners alike, so that if we amplify speech to enable the deaf to hear, so long as we avoid causing pain, there will be no fatigue and no damage will be done to the hearing mechanism. Therefore the regular use of a hearing aid does not increase deafness. On the contrary, frequently some improvement is noted, probably because the patient's attention is once more turned to outside interests rather than being focused on himself, a fate which all deaf people seem unable to avoid.

With regard to the actual prescription of these aids, unfortunately at present there is no more detailed method available than is indicated by the above-mentioned summary. Even with careful audiometer tests carried out with a properly calibrated audiometer, methods of matching a small hearing aid to a hearing loss curve are not feasible.

In cases of perceptive deafness, when the patient has lost the hearing to high tones, and as a result misses consonants but can hear vowel sounds, trusting to lip reading to carry him through a conversation, we find that the valve amplifier gives some relief. These are the patients who hear apparently normally to a certain distance (a circle in which they stand as centre) and then outside this range suddenly lose all power of understanding speech. By the amplification of the higher frequencies and the incorporation of automatic volume control these patients can have their hearing range extended. I have found, however, in practice, that many elderly people will not bother with electric hearing aids; the inconvenience of carrying an apparatus including batteries, wires, coupling devices *et cetera* is not worth the advantage they obtain by their use. My experience has been that while moderate perceptive deafness in the elderly is benefited by valve amplifiers, in advanced cases there is not much to be gained from electrical aids—certainly not from a microtelephone or bone-conduction receiver. These patients may be tried with a good valve set, but should be advised to consider a non-electrical aid. Even patients with moderate perceptive deafness usually prefer a non-electrical aid for individual conversation.

All patients with conduction deafness should be encouraged to use a valve aid. Only in the rare cases of conduction deafness with no loss of high tones should bone-conductor receivers be prescribed, as has been previously explained. Incidentally, bone conductors take a large amount of power from the battery and raise maintenance costs.

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A STATISTICAL STUDY OF THE ONSET OF PRIMARY DEMENTIA.

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PUBERTY is an event that is frequently considered to have an ætiological relationship to primary dementia. If this is so there should be a difference in the frequency distribution of the curve of onset in the two sexes. One would expect to find "a shift to the left" in the female curve of onset, corresponding to the generally earlier age of onset of puberty. The object of this study has been primarily to determine whether this is so, and secondly, to determine what significant differences exist in the frequency distribution in the sexes.

The figures were compiled from the records of patients present in the Victorian State mental hospitals at the end of 1939.

A considerable number of histories had to be discarded on account of the absence or the unreliability of information concerning the age of onset of the disease. All cases were excluded in which the diagnosis was in any way doubtful, in which the psychosis was associated with an obvious degree of congenital mental deficiency, and in which the differential diagnosis between paranoidal primary dementia and paraphrenia was not clear.

The ages of onset have been grouped in three-year periods from a lower limit of eleven to thirteen years to an upper limit of forty-one to forty-three years.

Although primary dementia is for the most part a disease of insidious onset, it can, and not uncommonly does, arise acutely in young people who could not, even a short time before, be shown to exhibit any psychotic traits whatever. By an acute onset is understood one occurring in a period of several days to several weeks. In the great majority of cases it is possible to say quite definitely that the illness began when the patient was so many years old, even if the exact week or month cannot be stated. When the year of onset is recorded the liability to error is not great.

Figures were obtained for 450 males and 408 females. The age distribution is shown in the second and fourth columns of Table I. The age distribution for each sex has been charted separately in Figures I and II. It may be argued that the total number of cases is too small to serve as a basis for comparison. However, each total is composed of two separate samples, and examination of the curves of frequency distribution for each of these figures (I and II) shows that the same tendencies manifest themselves in each pair of samples.

Examination of the graphs in Figures I and II shows that there are very distinct differences in the distribution of the ages of onset in the sexes. It remains to be determined whether these differences are "significant"—that is, whether they are of a degree of magnitude unlikely to be due to chance.

To make comparisons between the same age groups in both curves, the number of females in each group has been multiplied by $\frac{450}{408}$. The result is tabulated in column 5 of Table I. When numbers are small or when the total is multiplied by more than two, dangerous distortion is apt to occur and freak distributions are likely to be accentuated; but with a total of this magnitude, and with multiplication by only approximately $\frac{9}{8}$, the result is quite valid for comparative purposes.

In columns 7 and 8 of Table I the distribution in each age group ± twice the standard error is given. The standard error has been calculated from the formula $\sqrt{\frac{p \times q}{n}}$, where p equals percentage in a particular age group, q equals $(100 - p)\%$ and n equals the total number of observations.

It is unlikely that variations greater or less than twice the standard error will occur by chance more frequently than one in twenty times. If, therefore, columns 7 and 8 are compared, it can be said that if there is no overlap in the figures the difference is greater than is likely to be due to chance—in other words, it is significant. Whether or not the difference is significant is indicated in column 9 of Table I.

Above the curves of incidence in Figures I and II are given the population of Victoria in each age group. These figures are taken from the 1921 census (lower) and the 1933 census (upper). These are the "universe" of males and females from which the samples were drawn. There is a gradual, nearly linear, diminution of population as age increases. It can be seen that no material correction need be made in the shape of the curves of frequency distribution. If the correction were made it would show that the absolute liability to develop the disease in the lower age groups is slightly less and in the higher age groups slightly greater than the frequency curves indicate. The "skewness" of the curves would be slightly accentuated.

Discussion.

Study of the graphs in Figures I and II and of the final column of Table I shows that there are three age periods in which there is a significant sex difference in the incidence of the disease. (i) Of the females who develop the disease, more do so between the ages of eleven and sixteen years than do males. (ii) Of males who develop the disease, many more do so in the age period between twenty and twenty-two years than do females. (iii) Of females, more develop the disease between the ages of thirty-two and thirty-seven years than do males.

TABLE I.

1 Age of Onset. Three-year Age Groups.	2 Number of Male Patients.[1] (450)	3 Standard Error for Column 2. $\sqrt{\frac{p \times q}{n}}$	4 Number of Female Patients.[2] (408)	5 Females Multiplied by $\frac{450}{408}$	6 Standard Error for Column 5. $\sqrt{\frac{p \times q}{n}}$	7 Females Multiplied by $\frac{450}{408}$ (Column 5.) $\pm 2\sqrt{\frac{p \times q}{n}}$	8 Males. (Column 2.) $\pm 2\sqrt{\frac{p \times q}{n}}$	9 Overlap between Figures in Columns 7 and 8.
11 to 13	0	0	3	3·3	0·4	4·1—2·5	0—0	0
14 to 16	20	0·97	25	27·6	1·13	29·9—25·3	21·9—18·1	0
17 to 19	69	1·7	65	71·7	1·7	75·1—68·3	72·4—65·6	+
20 to 22	115	2·05	72	79·4	1·8	83·0—75·8	119·1—111·9	0
23 to 25	102	1·95	93	102·6	1·95	106·5—98·7	105·9—98·1	+
26 to 28	62	1·44	58	64·0	1·63	67·3—60·7	64·9—59·1	+
29 to 31	36	1·3	37	40·8	1·33	43·5—38·1	38·6—33·4	+
32 to 34	29	1·1	34	37·5	1·3	40·1—34·9	31·2—26·8	0
35 to 37	11	0·73	15	16·5	0·88	18·3—14·7	12·5— 9·5	0
38 to 40	4	0·44	4	4·4	0·46	5·3— 3·5	4·9— 3·1	+
41 to 43	2	0·31	2	2·2	0·31	2·8— 1·6	2·6— 1·4	+

[1] Males.
Mean = 23·9 years.
Standard deviation = 5·04.
Coefficient of variation = 21·0%

[2] Females.
Mean = 24·3 years.
Standard deviation = 5·8.
Coefficient of variation = 23·8%.

The shape of the curves differs in several particulars. (i) The "female" curve has a delayed peak of lesser magnitude, with a higher incidence at the upper and lower age limits. This is expressed statistically by the

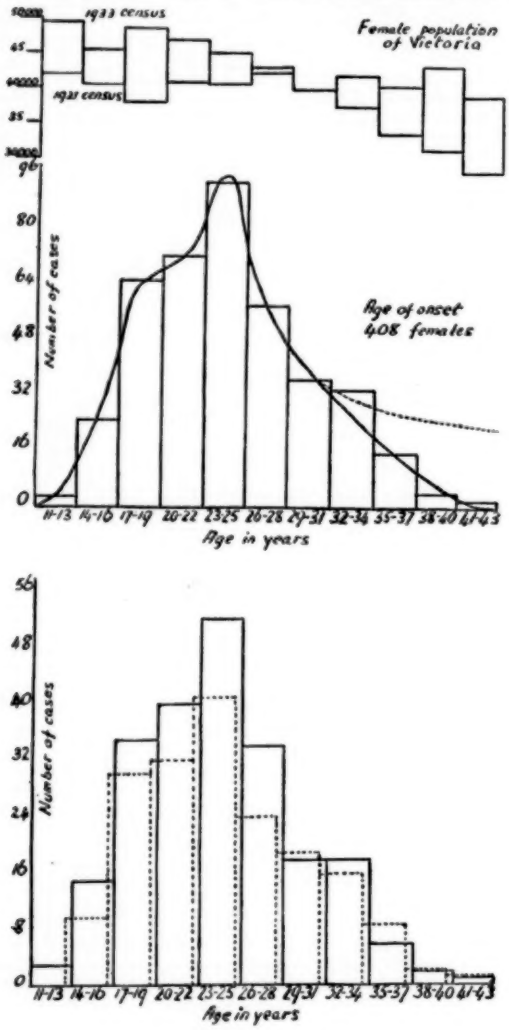

FIGURE I.
Sample A (continuous line) = 224 cases; Sample B (dotted line) = 184 cases.

greater value for the standard deviation (5·8 for females, 5·04 for males). (ii) The maximal age incidence is in the twenty-three to twenty-five years group in females, in the twenty to twenty-two year group in males. The mean age of onset is slightly later in females (24·3 years) compared with males (23·9 years). (iii) The "female" curve has a distinct hump on its ascending part. There is no indication whatever of this in the "male" curve, which rises steeply and smoothly to its maximum. What is responsible for this difference I am unable to conjecture.

In both sexes there is a very rapid fall in the incidence of the disease after the age of thirty-five years. From the appearance of the curves in the first half of their descent—that is, from the twenty-three to twenty-five year group to the thirty-two to thiry-four year group—one would expect both a much higher incidence of cases in the last three age groups and the appearance of cases even as late as the sixth decade of life. The dotted continuation of the descending parts of the curves in Figures I and II represents an approximate theoretical incidence for these age periods.

I believe that the incidence recorded is not a reflection of the true incidence of the disease over these later age periods. There is a definite reason for this, in the general reluctance to diagnose a psychosis as *dementia præcox* if the patient is a person aged over thirty-five years. It is usually called paraphrenia, even though, if the patient

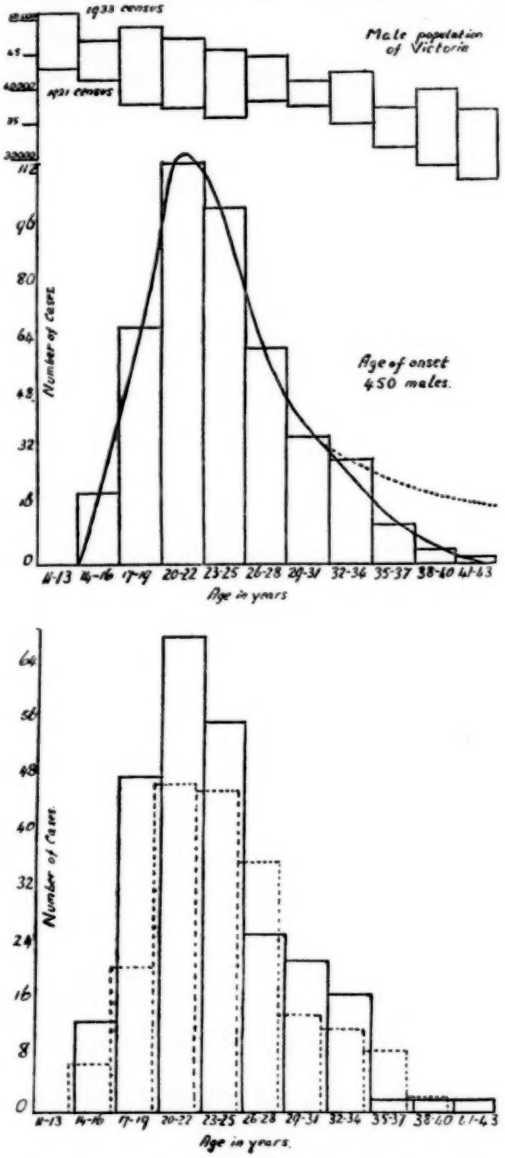

FIGURE II.
Sample A (continuous line) = 256 cases; Sample B (dotted line) = 194 cases.

were fifteen years younger, it would undoubtedly have been labelled *dementia præcox*. In my experience, psychoses clinically indistinguishable from *dementia præcox* do occur not uncommonly in the fifth decade and should be diagnosed as such.

Present teaching, following the work of Kraepelin, is that there are all gradations in the schizophrenic states, from hebephrenic primary dementia at one end of the scale to true paranoia at the other. It is a well-known clinical

fact that there is no sharp dividing line between paranoidal primary dementia and paraphrenia, that often enough it is impossible to make a differential diagnosis. It appears to me not only difficult but quite unnecessary to attempt to distinguish between these states, as they are not closely related psychoses, not sub-species of the genus schizophrenia, but actually clinical variants of one and the same psychosis. It is not suggested that the terms "primary dementia" and "paraphrenia" be discarded in favour of the wider concept of schizophrenia, because in typical instances the terms do refer to states clinically dissimilar in various respects; but if the terms are used, it must be with the clear understanding that they refer only to clinical types of the one disorder, and not to two even closely related psychoses.

The syndrome paraphrenia probably occurs most commonly in the fifth and sixth decades, and it is likely that if the frequency distribution of the age of onset were plotted graphically and the curve superimposed on that for primary dementia, the combined curve would correspond very closely to the theoretical continuation of the curve for primary dementia alone. Further statistical data is being sought to determine whether this is so.

Acknowledgements.

My thanks are due to Mr. Gawler, Victorian Government statist, for his helpful advice and criticism, and to the medical superintendents of the Victorian State mental hospitals for either collecting for me or allowing me to collect the necessary data.

Reports of Cases.

GAS GANGRENE INFECTION TREATED BY DEEP X-RAY THERAPY.

By HAROLD HAM,
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AT a time when the nation is at war and injuries on a scale previously unknown are likely to occur, the recording of the successful treatment of gas gangrene infection is considered of great importance. The following patients have been treated at the Prince Henry Hospital, Sydney, during the last seven months.

Case I.

L.C.T., a schoolboy, aged seven years, fell 25 feet from a tree on December 9, 1939, and sustained a compound fracture of the lower end of the left humerus and fractures of the lower ends of the left radius and ulna. He was admitted to the Prince Henry Hospital on December 12, after having had reduction of the fractures, attention to the wound, the administration of 38,000 units of gas gangrene antiserum and also antitetanic serum and sulphanilamide at another hospital. It was reported that Gram-positive bacilli had been found in a direct smear.

On his admission to the Prince Henry Hospital the left upper extremity was in a plaster cast. Examination of the antecubital region revealed the characteristic œdema, crepitant sensation and musty odour of gas gangrene. The child was very pale and appeared to be suffering severely from toxæmia.

The plaster cast was removed and several incisions were made into the œdematous areas and a serosanguinous fluid was exacuated. There was a lacerated wound exposing the *lacertus fibrosus* and the tendon of the *biceps brachii* on the medial side of the cubital fossa, and there was uniform swelling extending up and down the arm. On the day of the child's admission to hospital deep X-ray therapy was applied to the left upper limb centring over the wound. A dose of 300 *r* was given, and this dose was also given on the following day. The administration of sulphanilamide was continued. Six days later the condition of the arm was greatly improved and there were signs of granulation in the wound.

On three separate occasions Gram-positive anaerobic bacilli giving the cultural and fermentation reactions of *Clostridium welchii* were recovered from the wound. It is interesting to note that this organism was not recovered from swabs taken from the wound on January 5. X-ray examination revealed gas shadows in the soft tissues near the elbow.

On December 22 the patient's condition had so far improved that a general anæsthetic was given, the fractured humerus was levered into position, and the plaster cast was reapplied. The plaster cast was removed on January 30, 1940, and later massage was given. The child was discharged from hospital, very well, on March 3, 1940.

Case II.

E.V., a young man, aged eighteen years, was involved in a road accident on December 10, 1939, and sustained a compound fracture of the right humerus with two lacerated wounds, one on the posterior aspect of the arm and the other right across the antecubital fossa; both wounds exposed muscles.

He was admitted to another hospital and thirty hours later signs of gas gangrene were first noticed; serosanguinous discharge mixed with gas bubbles exuded from the wound in the antecubital fossa and there was much swelling of the surrounding area. Gas gangrene antiserum in three doses totalling 50,000 units was given intramuscularly, and sulphanilamide was administered every four hours.

On the patient's admission to the Prince Henry Hospital on December 12 there was a lacerated, foul-smelling wound in the right antecubital fossa; it had an œdematous edge and the typical musty odour of gas gangrene. There were a fracture of the middle third of the right humerus and a laceration on the posterior aspect of the arm, which did not appear to be involved by the infection. The patient was very pale and obviously very ill.

Multiple incisions were made into the gangrenous areas on the day of his admission to hospital, and deep X-ray therapy was applied to the right upper limb from the shoulder to the wrist, 400 *r* being given to each of two areas. The same dose was given to the same areas on the following day, and on December 15 a dose of 200 *r* was given.

On December 19 the condition of the wound at the elbow had improved and there were signs of granulation. The patient's general condition was better. The pathologist reported that anaerobic organisms with cultural and fermentation reactions of *Clostridium welchii* were recovered from the wound on December 15 and 22. It was not found in a swab taken on January 5. X-ray examination of the limb revealed shadows in the soft tissues strongly suggestive of gas gangrene.

On December 24 secondary hæmorrhage occurred from the radial artery in the cubital fossa; this necessitated blood transfusion, which was given by the continuous drip method. By the end of January, 1940, the patient's condition was much improved and skin graft operations had been begun. Early in March the ulcerated area on the right arm was healing well and a tube graft from the thorax was implanted on the arm. On June 18 he was discharged from hospital with the arm in a splint.

Case III.

G.T., a man, aged twenty-two years, sustained compound fractures of the right leg and left forearm as the result of a motor car accident on January 22, 1940. He had been admitted to another hospital, where *débridement* of the wounds and the application of plaster casts were carried out, and 1,000 units of both gas gangrene antiserum and antitetanic serum were given. On January 24 the temperature rose and vomiting and anorexia were present. A window was cut in the plaster, and definite crepitus in the region of the wound, gas bubbles and a vile smell were noted. Examination of a swabbing taken from the wound was said to reveal the presence of *Clostridium welchii*. The patient was given "M & B 693" and 20,000 units of gas gangrene antiserum. The same dose of serum was given on the following day.

He was transferred to the Prince Henry Hospital on January 25, with the right lower limb in a plaster cast from the thigh to the toes. A window in the plaster over the middle third of the leg displayed a fracture of both bones with an offensive serous discharge. There was also a fracture of the left radius at the junction of the middle and lower thirds. The patient was sweating, restless, and looked very ill. The following day a blood transfusion was necessary.

X-ray examination a few days later revealed the characteristic appearance of gas gangrene in both upper and lower limbs. On several occasions Gram-positive motile bacilli with the characteristics of *Clostridium histolyticum* were recovered from the wound.

Deep X-ray therapy was applied on the day of his admission to hospital to the right leg from the knee to the

toes, to the right thigh, and to the right half of the abdomen. This extensive area was irradiated so that the treatment would be well wide of the infection. A dose of 400 *r* was given to all these areas and repeated the following day. On January 27, 200 *r* were given to the right half of the abdomen and 400 *r* to the anterior aspect of the left forearm. The same dose was given to the left forearm on January 28.

Gradual improvement in the general condition of the patient followed. On February 17 both fractures were manipulated and fresh plaster casts were applied. The fracture of the leg was again manipulated on March 7, under gas anæsthesia, a large sequestrum was removed from the leg wound and a fresh plaster cast and a Thomas's splint were applied. The patient is still in hospital.

Case IV.

L.R., a man, aged twenty-two years, was involved in the same motor car accident as the previous patient, on January 22, 1940, and sustained a compound fracture of the lower end of the left femur.

Débridement of the wound and extension of the limbs on Thomas's splints were carried out on the day of the accident at another hospital, and 10,000 units of gas gangrene antiserum and 1,000 units of antitetanic serum were administered. Two days later the patient was not so well and *Colstridium welchii* was reported to have been obtained from the wound. A further 24,000 units of gas gangrene antiserum were therefore given. He was transferred to the Prince Henry Hospital on January 25.

On his admission there was an open wound of the middle of the left thigh, exuding an offensive brown discharge. The patient was not very ill. However, the pathologist reported that *Clostridium welchii* was recovered from the wound on two occasions; and X-ray examination revealed irregular shadows in the soft tissues suggestive of gas gangrene.

Deep X-ray therapy was applied to the whole left thigh on the day of his admission to hospital and again on the following day. A dose of 400 *r* was given on each occasion. On February 8 a small blood transfusion was given. The infection soon subsided, and he has since remained in hospital for treatment of his fractured femur.

Case V.

G.W., a man, aged twenty-six years, was struck on the right side of the face and shoulder girdle on February 2, 1940, and sustained severe lacerations of the right shoulder region, rupture of the *pectoralis major* and general muscle trauma of the *musculus deltoideus* and the *musculus biceps brachii*. There was also a depressed comminuted fracture of the roof of the right orbital cavity and the zygoma.

He received treatment at another hospital. On February 4 the temperature and pulse rate became elevated and anorexia was present, together with swelling of the limb, soft crepitus and foul smell. Examination of a swab revealed Gram-positive bacilli similar to *Clostridium welchii*. The patient was given 80,000 units of gas gangrene antiserum over a period of three days, and also 1,500 units of antitetanic serum.

He was transferred to the Prince Henry Hospital on February 5. On his admission a lacerated wound, four inches long, was present along the inner edge of the right deltoid muscle and downwards into the axilla, from which blood-stained serum was draining, and there was œdema of the whole shoulder girdle. The patient looked ill, and the following day soft crepitus was felt over the right shoulder. An X-ray examination revealed shadows in the soft tissue in the upper part of the arm, strongly suggestive of gas gangrene. Deep X-ray therapy was started on the day of his admission to Prince Henry Hospital and was applied to the right side of the face and neck, to the anterior aspect of the right axilla and thorax, and to the posterior aspect of the right forearm. A dose of 400 *r* was given to these areas and repeated the following day. "M & B 693" was given every four hours for eight doses, commencing on February 6.

Gram-positive bacilli, which gave the reactions of *Clostridium histolyticum*, were recovered anaerobically from the wound on February 5 and 6. On February 9 the œdema and crepitus had gone and the patient felt better and was sleeping well. On February 17 the wound was healing well by granulation; and on March 8 the arm was put up in an aeroplane splint to prevent contraction. The wound was then almost dry. The patient was discharged from hospital on March 19.

Comments.

Cases I, II and IV were undoubtedly cases of gas gangrene infection on all grounds, clinical and bacteriological. Clinically the other two cases were also typical, and there is no reasonable doubt of the diagnosis in either case. The *Clostridium welchii* was not recovered at the Prince Henry Hospital, but X-ray examination revealed unmistakable gas in the tissues.

In a well-established case, when there are a number of discrete bubbles or extensive infiltration of gas in the tissues, the X-ray appearances are diagnostic. Experience in the last war showed that X-ray evidence of gas infection was seen frequently before the clinical signs. Early X-ray examination is therefore of the utmost importance.

It is not too much to say that those of my colleagues on the staff of the Prince Henry Hospital who were associated with these cases and who carried out the medical and surgical care in such an expert manner have been profoundly impressed by the results and are convinced of the great value of X-ray therapy. It should be especially noted, first, that all patients have recovered from the infection, and secondly, that in no case has amputation been necessary.

In all five cases large doses of gas gangrene antiserum were administered, and in four cases a drug of the sulphanilamide group was given as well. Craig[1] has pointed out that the value of large doses of serum is still open to question. In all cases X-ray therapy was administered on two or three successive days over all areas suspected of infection. In this series the X-rays used in treatment have been generated at 200 kilovolts; but it has been shown by Kelly[2] that X-rays at low or medium voltage are equally valuable. The doses employed are very small and cannot possibly do any harm.

The loss of life and limb from gas gangrene infection in the last world war was enormous. In X-ray therapy we appear to have a measure which will drastically reduce the mortality and the frequency of amputation.

X-ray manufacturers can provide us with apparatus which will serve the dual purpose of radiography and X-ray therapy at medium voltage. Is it too much to hope that such plants will be installed in base hospitals and perhaps casualty clearing stations with our forces?

Acknowledgements.

I should like to thank the staff of the St. George District Hospital, Sydney (from which hospital the patients were referred), for notes on the cases; my colleagues on the staff of the Prince Henry Hospital, and especially Dr. R. J. Malcolm and Dr. Symington, for their cooperation, which enabled the patients to have treatment early; Dr. C. J. M. Walters for his helpful encouragement; and Sister Burns, the deep X-ray technician, for her keenness and skill in dealing with the patients.

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EPISTAXIS: LIGATION OF THE EXTERNAL CAROTID ARTERY.

By T. BOYD LAW, F.R.A.C.S.,

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EPISTAXIS arising from small vessels on the septum (by far the commonest variety) does not as a rule cause serious worry. Even after major surgical procedures, such as the fronto-ethmo-sphenoid operation, hæmorrhage is easily controlled by the Ferris-Smith technique. Hæmorrhage following trauma can, however, be very annoying, as the following case will show.

Clinical Record.

R.K., aged twenty-four years, was severely manhandled in a tavern brawl on July 6, 1939. The time immediately following the event was alcoholically obscure, but it would appear that he was able to go home unassisted. About twelve hours after the injury he commenced to bleed freely from both sides of the nose, but especially from the right side, and he spat out great mouthfuls of blood, which he said he could feel running freely down the back of the throat. When he was seen by Dr. Bluett there was no evidence of trauma whatsoever, and it was surmised that the hæmorrhage had arisen as a result of a blow which

the patient said he had received on the right side of the nose. Morphine was given and later the right side of the nose was packed, but this procedure was unsuccessful, and it was found necessary to insert a post-nasal plug and to pack onto this to control the bleeding. Gentle removal of the plugs some twenty-four hours later was followed by another violent hæmorrhage; but this was controlled by the insertion of a post-nasal plug and by gentle pulling on the tape which passed through the nose. The blood was examined, but no abnormality of bleeding or coagulation time was found.

Hæmostatics had already failed to influence in the slightest degree the violent bleeding which occurred every time the plug was removed. All efforts to locate the bleeding point accurately by means of a post-nasal mirror were futile, and when I looked into the throat while the hæmorrhage was going on I noticed that the blood fairly spurted down from behind the palate. Only a vessel of some moment could produce such a hæmorrhage, and it was inferred that it was the spheno-palatine artery or a branch.

On July 11 a blood transfusion was given by Dr. Bluett, with an immediate improvement in the patient's condition; but a further attempt gently to remove the plug was followed within fifteen minutes by the same free hæmorrhage. The patient himself volunteered the information that the act of swallowing was sufficient to start the bleeding.

On July 15 the patient complained of pain in the right ear, and we knew that the Eustachian orifice was not to be indefinitely insulted. Strangely enough, when the plug was removed there was no immediate bleeding and we thought that perhaps the condition was finally going to settle down. Examination at this stage with the post-nasal mirror revealed only masses of blood clot in the naso-pharynx. A tape was left tied loosely through the right side of the nose and mouth with a plug attached ready for reinsertion. Five hours later the hæmorrhage recommenced violently, and although I proceeded at once to the hospital the patient had lost a considerable quantity of blood before the plug could be drawn into position. It was considered now that the best line of attack was ligation of the external carotid artery, and this I performed under local anæsthesia after the patient had received another blood transfusion. The plug was removed after the operation and there was no further hæmorrhage; the patient made an uneventful recovery.

Discussion.

Fracture of the base of the skull with tearing of the periosteum and mucous membrane may certainly have been a possibility in this case, even in the absence of other signs and symptoms of such a lesion. Weight would be added to such a view by the fact that no bony lesion could be found in or about the nose, and the patient was certainly vague as to the number of blows he had received and just where he had received them. Involvement of the ethmoidal vessels would, of course, require a different line of attack; but it was felt in this case that they had escaped damage.

POLYVALENT ANTIGEN THERAPY IN A CASE OF COMPLICATED INFECTION OF THE LOWER JAW.

By KEVIN B. GLASTONBURY, M.B., B.S.,
Adelaide.

Clinical Record.

THE patient, a woman, aged twenty-eight years, four months pregnant, was advised to have two teeth extracted, and consulted her dentist with this intention. She returned twelve days later, complaining of soreness in the lower jaw and a feeling of feverishness and general weakness. Inspection revealed that six teeth, comprising the premolar and the first and second molars on both sides of the lower jaw, had been extracted. The tongue was dirty and the lower jaw was considerably swollen on both sides. Bare bone, which was diagnosed as sequestrum, could be felt digitally. The blood picture was typical of secondary anæmia with leucopenia, the normal ratio of white cells being maintained.

Soon afterwards the patient's condition deteriorated so much that it was felt advisable to administer a one-minute anæsthetic only, and it was revealed that the lower jaw had been fractured on both sides and two sequestra about two inches long and half an inch to a quarter of an inch wide were removed. The whole of the lower jaw was now involved in an acute inflammation, the patient experiencing pyrexia and general malaise.

A bacteriological examination revealed staphylococci with traces of streptococci; 2-sulphanilylpyridine was administered, the first two doses each being of two grammes, and subsequent doses consisting of one gramme every four hours until 12 grammes had been given. These measures produced no perceptible improvement. Liver extract, dilute hydrochloric acid and iron and copper, all given orally, failed to effect any improvement in either the blood picture or the patient's general condition, which by this time was one of mental hebetude. The anæmia likewise proved intractable to injections of liver extract and vitamin B_1. Another sulphanilamide derivative, held to be specific for staphylococci, was resorted to, and produced a temporary improvement; but the patient soon relapsed and became comatose, with a pulse rate of 144 per minute.

The patient's condition was now very grave, and at the suggestion of a consultant "Edwenil" was administered every four hours, commencing with four doses of four cubic centimetres and continuing with doses of two cubic centimetres for three days. There was no immediate effect on the leucopenia, but the patient came out of her coma and showed a decided improvement in her mental outlook. The discharge from the jaw became more copious and there was a pronounced reduction of the œdema and pyrexia. The administration of dilute hydrochloric acid and iron and copper was now recommenced, and the hæmoglobin value, which had originally been 36%, improved after five days to 48%, and four days later had risen to 60%, at which it has remained. The infection having subsided, a transfusion of one and a half pints of citrated blood was administered. The temperature is now normal and the patient is able to sit up and take meals. She is still pregnant, and an uneventful delivery is probable.

Discussion.

This case illustrates the value of antigenic treatment as a supplement to chemotherapy when the patient's resistance is insufficient to obtain benefit from bacteriostatic agents. I am of the opinion that "Edwenil" saved this patient's life.

Reviews.

WAR DISEASES.

SIR ARTHUR HURST has roused himself from his semi-retirement at New Lodge to revise his book, "Medical Diseases of War".[1] The first edition, published early in the last war, was a slim volume; it has now appreciably thickened. Hurst has three collaborators—Barber, who writes on skin diseases; A. T. Ross, who writes on anxiety neurosis; and F. A. Knott, who deals with bacteriology.

It is a curiously uneven book. One hundred and thirty of its three hundred and fifty pages are devoted to hysterical manifestations — hysterical palsies, hysterical attitudes, hysterical mutism, hysterical blindness, and hysterical deafness. There are excellent case histories and a very good discussion of the conditions generally; but there is somehow a failure to show that all these conditions are manifestations of one condition, and that it is that condition which demands treatment.

Hurst assumes that every medical officer can carry out his form of treatment. This is wrong; there are men or women who have the gift of being able to secure the patient's confidence at once, or, in the words of the analyst, of "setting up a transference". There are others who have not.

When he wrote the first volume Hurst had been having the impressive initial successes that so many other people achieved with hypnotism. By the second edition of 1918 Hurst had found some of the limitations of the method and was tending to develop the Dejerine rationalizing technique, which seems to be his limit in psychological treatment. It is a method eminently successful in achieving good results in recent cases, especially in the "conversion hysterias"—paralyses, blindness, deafness and mutism.

Hurst himself writes the chapters on the hysterical manifestations which occupy a large part of the book—130 out of 350 pages. He goes into great detail in describing various manifestations, and there are excellent chapters with illustrations of the different forms of hysterical con-

[1] "Medical Diseases of War", by Sir Arthur Hurst, M.A., D.M., F.R.C.P., with the cooperation of H. W. Barber, M.A., M.B., F.R.C.P., F. A. Knott, M.D., M.R.C.P., and T. A. Ross, M.D., F.R.C.P.; 1940. London: Edward Arnold and Company. Demy 8vo, pp. 327, with illustrations. Price: 16s. net.

tractions and of "soldier's back". These are valuable, as too often in the past these have been mistaken for organic conditions with unhappy results.

But it must be confessed that these chapters show a good deal of repetition and unnecessary description. Hurst used to claim that the symptoms disappeared under persuasion and reeducation.

When his account is reread the position seems to be: (i) Seale Hayne (the hospital where Hurst worked) had a very great reputation for good results—an "atmosphere of cure" in fact was present. (ii) Hurst's well-known charm of manner and gift for inspiring confidence are well known. (iii) There was a spirit of interest and enthusiasm with which he inspired his whole staff, and the possibility of failure was scouted. (iv) In fact a rapid "transference" was established and the first difficulty was surmounted.

Hurst is strongly against the removal of amnesia, and states that it often produces a state of anxiety. This view is not held by many psychotherapists, who have shown that it is essential to remove this amnesia in order to obtain a final satisfactory result. In fact, unless one were given more detail of the reeducation and explanation given these men, one would be left with a feeling that while a symptom had been relieved the basic condition was almost untouched.

The chapter on anxiety neurosis in Ross's hands is one of the best in the book. Ross (whose book on the common neuroses should be in the hands of every practitioner) graduated from organic nervous disease to the functional, and his writing is rich in clinical knowledge and common sense. Ross's chapter on the anxiety neurosis is in our opinion so good and so valuable that it should be read not merely by every senior physician, but by every regimental medical officer. It is written in Ross's easy lucid style, and in it he discusses the anxiety state as seen in the soldier from the front line to the base. His views may be very briefly summarized. First he lays stress on the importance of the regimental medical officer who becomes known and trusted by his men. They know him and talk freely to him, and he is able to deal with mild cases on the spot by discussion, explanation and reassurance. Then follows his insistence (which Hurst supports) on the need for treatment near the front line by officers with a real knowledge of these conditions. Finally, Ross gives long examples of the lines along which each individual case should be tackled. He explains too why the man with an hysterical paralysis has no anxiety; but its "cure" is often followed at a short interval by the onset of acute anxiety symptoms.

Freud's name does not appear, psychoanalysis is not mentioned, yet no analyst could take exception to a word of his statements, and his results are obviously excellent. With one statement there may be a difference of opinion—he would give no pension for any neurotic disability. Such an attitude might be fair enough if all soldiers suffering from neurosis had had fair medical treatment; but it is notorious that certain cases are the result of bad treatment and of medical ignorance. There is, however, no doubt that there is a very large crop of post-war neuroses in persons who should never have received any pension benefit and who do so only through the complaisance of politicians.

A very striking omission from these chapters is any mention of post-traumatic subdural hæmatoma. There is no mistake more easy than to diagnose symptoms of this condition as being of "neurotic origin", and the distinction requires most careful examination and judgement.

Of the other chapters one is devoted to a special discussion on "soldier's heart". Here again there are many classifications and possible ætiological factors. The part played by the nervous factor to which most later workers, including Whishaw in this journal, attach so much weight, Hurst considers relatively unimportant. Ross, on the other hand, gives an admirably succinct account of this factor.

The remainder of the book is devoted to the organic war diseases, and these sections are exceedingly good. The article on trench fever, for instance, is first rate. Any young resident medical officer reading this would have a clear picture to guide him should cases occur in his battalion; the warning of the dangers attendant on over-hospitalization should be learned by heart in hospitals dealing with these or any other types of mild chronic illness.

Similarly, the chapter on the typhoid group is an admirable piece of clinical writing. It is rounded off by a lucid account of the bacteriological and serological tests, by G. A. Knott. He discusses the difficulties and improvements in diagnosis introduced by the recognition of the *H* and *O* antigens and the problem of the "Vi" antigen, and lays emphasis on the value of prophylaxis by inoculation.

Hurst is an enthusiastic advocate of hexamine as a urinary and gall-bladder antiseptic; other observers are more doubtful, and recently the sulphanilamides are claimed to be equally, if not more, effective. A similarly good chapter is that on bacillary dysentery, and there is an interesting note that the German Army suffered severely from dysentery during the Polish campaign. There is a sound chapter on tetanus, with the recommendation of adequately large doses of antitoxin and a very interesting discussion on localized tetanus.

War nephritis receives a short but adequate notice, and apparently the end results in the British Army were better than in the Australian.

Hurst's other collaborator, H. W. Barber, contributes a chapter on skin diseases in war. The late E. F. Bashford once brutally classified skin diseases in war as (*a*) syphilis, (*b*) pimples that stop a man fighting, and (*c*) pimples that don't stop a man fighting; and it is surprising how very large the second class can become. It followed three conditions either alone or in combination—scabies, pediculosis and seborrhœa.

Barber spent much of the war in charge of a large skin department and his article is marked by simple practical knowledge. For the civil practitioner as well as the military surgeon this chapter is full of meat; for the latter it is indispensable.

His article shows some interesting omissions. Heliotropine, which is by some considered a specific for the body louse, is not mentioned. The benzyl benzoate and the nascent sulphuretted hydrogen treatment of scabies are not included, though American authors have praised them highly.

The book concludes with a short but adequate chapter on "Gassing". Hurst describes the nature of the different gases used, their effects and the measures used in prevention and treatment. It is curious that he omits the striking feature of phosgene poisoning—the delayed heart failure on exertion, which was first recognized by the late W. J. Addie at its first use in 1915. His description enabled Dale to recognize that the Germans had begun to use phosgene. One rather important feature in mustard gas eye damage is that in rare cases blindness has occurred ten or more years after the original gassing; but this is not mentioned.

A curious omission is a chapter on cerebro-spinal meningitis; it was a real problem in all the camps in Australia, Canada, Great Britain and France. Granted that the condition is now much more amenable to treatment with the sulphanilamides, the necessity for early diagnosis and treatment is all the more urgent. There have already been grave epidemics in England.

Influenza is another most striking omission. There is no reason to believe that in the present war it may not become as great a scourge as in 1918-1919; but there is much more known about it. A short presentation of modern views would be most helpful to medical officers called upon to deal with even a small epidemic. Hurst may consider that these are not strictly "war" diseases; but among troops they take on characteristics which justify their inclusion in his book.

Altogether Hurst and his collaborators have produced a most valuable book. It contains a collection of medical information, only otherwise to be found scattered through many books. The writing is clear; there is sufficient dogmatism to inspire confidence, and a resident medical officer confronted by any of these conditions may turn to its pages certain of finding help.

TREATMENT BY MANIPULATION.

"TREATMENT BY MANIPULATION", by H. Jackson Burrows and W. D. Coltart, is a small book of 36 pages.[1] It is divided into two parts. The first deals with some of the indications for manipulation and points out some of the dangers. But these are disposed of in a few pages. The remainder of the book gives details of the manipulations to be carried out in the treatment of each separate joint in the body. These are well described and well illustrated.

The chapter on the foot and ankle is well done, and treatment by the means described should save many a patient from being condemned to wearing foot supports for life.

Altogether the book is an excellent contribution to the subject of manipulation. It can be read in a few hours, and the application of the details given, if he pays due regard to the warnings and failures as described on pages 10 and 11, will help the practitioner in treating suitable patients.

This book can be thoroughly recommended to the medical profession and should serve a very useful purpose in calling attention to this important therapeutic measure.

[1] "Treatment by Manipulation", by H. J. Burrows, M.D., F.R.C.S., and W. D. Coltart, M.B., F.R.C.S.; 1939. London: Eyre and Spottiswoode, for "The Practitioner". Demy 8vo, pp. 36, with illustrations. Price: 5s. net.

The Medical Journal of Australia

SATURDAY, SEPTEMBER 28, 1940.

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WAR WOUNDS AND THEIR TREATMENT.

In the second volume of his book "The Australian Army Medical Services in the War of 1914-1918" Colonel A. Graham Butler points out that after the outbreak of hostilities it soon became necessary to have a precise definition of a wound. In 1916 the Director-General of Medical Services of the British Expeditionary Force laid down that: "A wound means an injury caused by or arising from the enemy, and includes injuries by rifle and gunfire, by bombs, bayonet, liquid fire, etc. Shock to the nervous system caused by bursting shell, and the effects of inhalation of poison gases, although producing no visible trauma, are to be regarded as wounds." Such a definition as this makes the subject of wounds a much larger one than would be imagined by anyone thinking of a wound in the generally accepted sense of a breach of the surface of the skin caused by trauma. It is also, of course, clear that in the present war civilians are liable to be wounded in the same way as combatants. If medical journals are to be taken as a guide, it may be concluded that a knowledge by every medical practitioner of at least the principles underlying the treatment of wounds is regarded as essential. Journals have been full of articles relating to past experience in the matter of wounds, stating guiding principles for future action and recording attempts to introduce new or improved methods of treatment. There is no excuse for any practitioner to be ignorant on this subject. Towards the end of last year a useful series of articles by members of the Victorian Branch of the British Medical Association dealing with civilian air raid casualties was published in this journal. *The British Medical Journal* has had series of special articles on war wounds and air raid casualties; and these have been republished as a separate volume. *The Lancet* has also published important articles. In spite of all this, reference to this subject is necessary, and for at least two reasons. The first is that some forms of wound treatment are admittedly still in the experimental stage, while others perhaps have not become firmly established; the second is that lessons learned during the last war are sometimes forgotten and must be learned again.

Taking the second of these first, we should recall the deplorable state of affairs that developed at the beginning of the last war, when surgeons came face to face with conditions for which they were unprepared and which they did not know how to meet. We remember the failure of pre-war methods of surgical attack and the appalling loss of life that it entailed. Then we call to mind with shame the long delays that took place before new methods, well grounded, proven and recommended, were put to general use and the reasons for the delay. Surely, it might justly be said, the process was so revolutionary and so painful that the impression would be lasting, and even if details of technique became vague, the underlying principles would remain clear and unshakable. And yet we hear that in the present war one consulting surgeon attached to the army writes mournfully of the surgeons working under him. Without exception, he states, they are relying far too much on laboratory tests and have no experience whatever in judging the condition of the patient from clinical examination. He describes some regrettable surgical experiences and adds that not sufficient attention is being given to experience gained in the last war and forgotten since then.

Turning to methods of treatment, we find that a great deal has been done and is still being done on the subject of gas gangrene. In spite of new work, it is still recognized that diagnosis can, and as a rule should be, made from clinical findings alone. It does not take long for an army surgeon to learn to recognize the characteristic pallor of a patient whose wound is becoming affected by gas gangrene, nor the smell and crepitation of the wound itself; with added experience suspicion is aroused at an earlier stage. At the same time, as many writers have shown, X rays may be used for diagnostic purposes in the early stages as well as in treatment. It has been stated that X-ray therapy can have little or no place in the treatment of gas gangrene under war conditions. Whether this is true or not will depend on the type of warfare and on the situation of the hospitals or casualty clearing stations at which wounded men are treated. At places where X-ray equipment can be installed and used, it will be found most effective. Great things were hoped of both gas-gangrene antiserum and the use of sulphanilamide compounds. Serum certainly has some good results to its credit, but as *The British Medical Journal* has recently pointed out, its use must be regarded as still being on trial—"it may minimize the risk of infection and limit its spread". Sulphanilamide is claimed to be more effective than serum, particularly from the prophylactic point of view. If sulphanilamide is to prevent the occurrence of gas gangrene, it must be present in the blood of the patient at the time when the gas gangrene organisms are introduced into the tissues, or very soon afterwards, and in a concentration sufficient to prevent their growth. Short of insistence on the immediate administration of fairly large doses of sulphanilamide to every person who receives a wound, it is not clear how prophylaxis with drugs of this type can be carried out. Investigations that may lead to useful results have been carried out by Dr. E. Singer at the Baker Institute, Melbourne. It will be remembered that in June of this year Dr. Singer published in this journal the results of some investigations on the treatment of gas gangrene with sulphanilamide and related compounds. He found

that no definite protection could be obtained in infections with *Clostridium septicum* and that complete failure occurred in infections with *Clostridium œdematiens*. He found that, even at best, the action of sulphanilamide drugs in infections with pure cultures of *Clostridium welchii* was weak in comparison with the powerful action of the same drugs on streptococcal and other infections. In this issue Dr. Singer records the results obtained by him in experiments with the combined use of serum and sulphanilamide drugs. His finding that by the administration of serum comparatively small doses of the sulphanilamide drug are likely to be effective is promising. If this work can be confirmed and applied to human beings, it may have far-reaching results. His observations on the effect of suprarenal cortical hormone are also important.

Septic organisms other than those of gas gangrene have of course to be considered. We do not propose to attempt a long discussion of these, but would refer to one or two recent communications. In the issue of August 31, 1940, we published an abstract of an article by P. Bauwens from *The British Journal of Physical Medicine*, June, 1940, which shows that further light is being sought on this subject. Bauwens dealt with physical therapy in infective complications of war injuries. He discussed the use of ultra-violet rays, oxidizing agents and some dye derivatives. In the abstract particular attention was drawn to the increase of the organic peroxide content of cod liver oil before it is applied to the wound and after the wound has received an application of ultra-violet rays. Among the other agents mentioned by Bauwens were diathermy, infra-red radiation and X rays.

Perhaps it is an indication of the general lack of confidence that most surgeons have in any of the known measures of wound treatment, that the Royal Society of Medicine in London recently held a discussion on the effect of antiseptics on wounds, a discussion really taking those present back to the days of Lister.[1] Readers to whom this discussion is available are advised to read it, for it will remind them of general principles which are so easily forgotten in peace-time, when a septic wound is almost a rarity, and it will show them how antiseptics can be used to the best advantage. The most important long-standing truth that emerges from this discussion is that strong antiseptics cannot remove germs or dead tissue, and that the essential principle is the removal of dead and damaged tissue as well as of foreign bodies, followed by immobilization. When the place of antiseptics in wound treatment is considered, a careful distinction must also be made between prevention of infection and treatment of an infection already in progress. It was insisted that prevention was possible in open wounds treated within a few hours of their infliction, and that acridine compounds were the most suitable agents for this purpose.

Finally, although this discussion is not intended to be complete, mention must be made of the immense value that plaster of Paris has recently been shown to possess as an immobilizing agent in the treatment of war wounds.

It has already been stated that every medical practitioner needs to know something of the treatment of wounds; but it will no doubt be conceded that the knowledge of medical officers of the defence forces has to be wider than that of civilian doctors. This brings up at once the question that has already been raised by correspondents in this journal: shall the medical officers of the defence forces be senior men of mature judgement or shall they be recruited from younger and therefore livelier members of the profession? Without hesitation we can assert that the younger man is the better qualified to stand up to the enormous strain associated with the rush periods on active service. To overcome the ignorance of these men or their negligence of past experience, as we have seen has already happened, consulting surgeons of experience must be available in sufficient numbers to superintend younger surgeons in the early days of their war work—"'prentice days" might almost be a better term, since every surgeon on active service has to adjust his outlook to entirely new conditions and adopt practices suited to them.

[1] *Proceedings of the Royal Society of Medicine*, June, 1940.

Current Comment.

THE MECHANISM OF ACTION OF SULPHANILAMIDE.

MANY workers have tried to discover the mode of action of sulphanilamide since the early observations of Domagk and the later observations of Colebrook. These workers noted that in spite of the curative effect of the drug on hæmolytic streptococcal infections in mice, its bacteriostatic effect was less and sometimes absent *in vitro*, and that under certain conditions the organisms multiplied freely in a medium containing the drug. Paul Fildes, in a recent paper, has discussed the theories of bacterial growth and the suggestion that certain substances may be essential for the synthesis of protein by the cell enzymes, and that in their absence multiplication of the organisms could not occur.[1] He proved that the action of mercury as an antiseptic could be explained in this way, as the affinity of the Hg molecule for the SH group was so strong as to deprive the cell of this particular combination, and so of an essential metabolite.

D. D. Woods, following this hypothesis, set about finding a substance which would in its turn prevent the antiseptic action of sulphanilamide on the hæmolytic streptococcus.[2] He found such a substance in a yeast extract, and was able to identify it as para-amino benzoic acid. This yeast extract, when added to cultures of hæmolytic streptococci and sulphanilamide, allowed growth to continue. He then searched for para-amino benzoic acid in simple cultures of hæmolytic streptococci, and found that it was present in the strain with which he was working. Then he made a carefully graded series of experiments with young cultures of hæmolytic streptococci, adding sulphanilamide with and without added para-amino benzoic acid. If the organism was able to form sufficient of the essential metabolite, then added sulphanilamide would not inhibit growth. If the organism could not form para-amino benzoic acid and it was added to the medium, the sulphanilamide would not inhibit growth. If a complex medium was used in which para-amino benzoic acid occurred naturally, then the addition of sulphanilamide did not inhibit growth. If a given organism could produce sufficient para-amino benzoic acid to maintain its metabolic processes, then it would be resistant to sulphanilamide. If not, the addition of sulphanilamide deprived it of existing para-amino benzoic acid, and growth could not continue. The author found that the conditions under which an organism grew could be influenced considerably in regard to the production of the essential

[1] *The British Journal of Experimental Pathology*, April, 1940.
[2] *Ibidem.*

metabolite, and he thought that this probably explained some of the anomalous results obtained by some workers on the action of sulphanilamide. Woods points out that the theory explains why certain organisms are resistant to sulphanilamide and others sensitive to it, and why some organisms are sensitive when tested on a simple medium and resistant when grown on a rich medium, and that the so-called lag phase in the action of sulphanilamide in young cultures of sensitive organisms probably corresponds with the slow exhaustion of the naturally occurring essential metabolite. The work is a model of careful attention to detail and may well lead to a better understanding of the mysteries of the private life of one of man's greatest enemies, the hæmolytic streptococcus.

GONORRHŒAL VAGINITIS IN CHILDREN.

IN the *American Journal of Diseases of Children* of May, 1940, R. A. Benson and I. Weinstock review recent contributions to the knowledge of gonorrhœal vaginitis in children. No new light is thrown on the source of infection, but the importance of the infected home is emphasized. The disease is reported in children of all ages; but, in contrast to *ophthalmia neonatorum*, it is quite rare in the neonatal period. The importance of culture of the organism in addition to examination of smears is urged as a diagnostic procedure. Examination of smears is a much less reliable method than is culture, as borne out by Rorke's figures. He found in his series 517 cases in which both smear and culture were "positive"; 31 cases in which smears were "positive" and cultures "negative"; and 323 cases in which smears were "negative" and cultures "positive". The conclusion is that both methods should be used. Material can be collected most easily by dipping a glass catheter into sterile normal saline solution so that about half an inch of fluid remains in the catheter. This is then passed deeply into the vagina, and pus and organisms become suspended in the fluid, the single sample of which can then be used for both culture and smear. This is easier and less painful than the use of a cotton wool swab, and material can be collected from the depths of the vagina.

A large number of complications of the disease have recently been reported. From a series of 1,232 cases reported by various authors there have been 439 examples of urethritis, 236 of proctitis, 67 of general peritonitis, 14 of tubal infections, and smaller numbers of arthritis, ophthalmia, pelvic peritonitis, septicæmia, urethral duct infection, omphalitis and *otitis media*. Recurrence after apparent cure is still a problem, and opinion is divided as to whether it is caused by a persistent infection in the rectum or cervix or is caused by reinfection. The standard of cure recommended by the London County Council is observation for four months, provided smears and cultures are "negative" after cessation of treatment. A number of provocative methods have been suggested for revealing a cryptic infection during this period, but none has proved satisfactory.

Treatment by local antiseptic applications has proved on the whole unsatisfactory. Good results have been claimed, however, by the daily insertion into the vagina of silver picrate suppositories (one grain). The use of œstrogenic substances has been widely studied, and is accepted by many as the best form of treatment. These substances increase the number of layers of epithelial cells of the vaginal mucosa and render the vaginal secretion strongly acid. This response occurs two weeks after the treatment is commenced, and persists for four weeks after its cessation. The method is stated to be simple, efficient and rapid, and can be used at home. It sometimes causes swelling of the breasts and labia, growth of pubic hair, pelvic congestion and occasionally uterine bleeding, effects which rapidly disappear after cessation of treatment. The preparation "Amniotin" has been given by the oral, hypodermic, intramuscular and vaginal routes. The best results have been obtained by the use of vaginal suppositories containing 400 to 800 international units in a dose of 800 units daily. We should be inclined to suspect good results claimed after oral administration. Sulphanilamide has been used frequently in varying doses and courses, and with results varying from 19% to 100% of cures. There is no doubt that a rapid and lasting cure is often effected. When this is not achieved, further courses are reported to be without effect. The final word has not yet been said on this form of treatment.

MOTHERS UNDER SIXTEEN YEARS OF AGE.

AN interesting study has been made by Letitia Fairfield, senior medical officer of the General Hospitals Department of the London County Council,[1] of 74 consecutive confinements of mothers under sixteen years of age. She states in her opening paragraph that her study shows what happens when Nature is allowed to take its course. She hastens to add, however, that she does not dispute the condemnation on social grounds by western civilization of very early motherhood. The social background in these cases was "very varied, obscure, and tinged with moral squalor". Obviously there was every motive for concealment and reticence. Histories of assault were very uncommon; some, especially among the younger girls, had been the victims of incest, while others were irresponsible and precocious children who had been running wild. It should be stated that these 74 confinements occurred in a series of 133,361 deliveries in a group of 23 municipal maternity units and one voluntary hospital during the period 1931-1938. The point that Fairfield makes is that none of these 74 mothers died and that there were two stillbirths and three neonatal deaths. All the mothers made a good recovery. Inspection of the case records showed that for the institutions concerned there was a very slight increase in these cases over the normal rate of forceps deliveries, surgical inductions and slight morbidity in the puerperium. The labours were, with few exceptions, short and easy to an unusual degree; complications, especially in the third stage, were rare. There was no evidence that maternity had produced excessive nervous or mental strain in these girls, and no instance of mental or nervous breakdown has been traced. The average weights of the infants "were below normal for mothers of older age-groups, owing to the excessive proportion of small immature infants in the series". From the information in this paper it is not possible to form any idea of the percentage of births of this kind in the United Kingdom. Available figures for the Commonwealth of Australia are of interest, although they are not really comparable with those given by Fairfield. We read in the "Commonwealth of Australia Yearbook" that the number of live births in Australia during 1938 was 120,415, a birth rate of 17·46 per thousand. The figures for mothers under sixteen years are not given; but it is stated that 44 mothers were under fifteen; those aged between fifteen and nineteen numbered 7,230. It is probably not surprising that the deliveries of the children described by Fairfield were as easy as she has stated, and in this connexion we have to remember that the condemnation by western civilization of very early motherhood rests on many grounds. No one will agree that it would be good for the community if motherhood commonly occurred under the age of sixteen years. Fairfield, as we have already pointed out, has stated that the social background in her cases was "very varied, obscure and tinged with moral squalor". It is on this account that society stands condemned. That Fairfield found no evidence of excessive nervous or mental strain in these girls is in a large measure offset by the moral squalor in which they lived. In the new social order, whose advent we would all hasten, moral squalor will, we trust, not find such scope as it does today. Many persons will say that moral squalor has been largely responsible for the experiences quoted by Fairfield. If this statement is allowed, we are forced to ask where Australia stands and to point an accusing finger at yet another reason for the reconstruction of society.

[1] *The Lancet*, July 20, 1940.

Abstracts from Medical Literature.

SURGERY.

The Treatment of Addison's Disease by the Implantation of Synthetic Hormone.

WARFIELD M. FIROR (*Annals of Surgery*, June, 1940) reviews the progress of the knowledge of Addison's disease since 1855, when Addison first described the effects of adrenal insufficiency. In 1894 a pressor substance was extracted from the adrenal medulla, and ten years later epinephrine was isolated. In 1929 Pfiffner and Swingle claimed to have prepared a potent cortical extract. Other workers continued these investigations; but the extracts were found to be of very variable potency, and they produced unpredictable effects. It was not until 1937 that Steiger and Reichstein synthesized a compound, desoxy-corticosterone acetate, capable of preventing death from adrenal insufficiency. A year later this substance was isolated from beef adrenal glands; the artificial synthesis thus preceded the isolation from natural material. Using dogs which had been subjected to adrenalectomy, Thorn, working at Johns Hopkins Hospital, found that the injection of this substance maintained the animals in good health. Subsequently, pellets of the crystalline compound were placed subcutaneously in the animals after the necessary dosage and the rate of absorption from the pellets had been calculated. This method was found to be more efficient than the daily injections. The author and Thorn have now treated 17 human patients by the implantation of pellets, and results are given. In all but two cases the patients have returned to full activity. Normal concentrations of sodium, potassium and chlorine ions in the plasma have been maintained. In no case has any untoward effect, such as hypertension, occurred, and this is attributed to careful computation of the dosage required and of the rate of absorption from the pellets before their insertion. The author does not consider the method ready for general use.

Diaphragmatic Hernia in Children.

JOHN B. HARTZELL (*The American Journal of Surgery*, June, 1940) reports on 68 cases of diaphragmatic hernia in children, aged under ten years, operated on by him. The mortality rate was 32%. Analysis of symptoms shows that under one year of age the presenting symptoms and signs are commonly cyanosis, dyspnœa and vomiting. In children aged over one year vomiting, pain and colic are more common symptoms. The mortality rate after operation for this condition has decreased in recent years. This is attributed to the following factors: (i) earlier diagnosis, the condition being suspected more frequently and X-ray examination being made for confirmation; (ii) better anæsthesia, positive pressure being used when necessary; (iii) adequate preoperative preparation; and (iv) general improvement in technique. This last includes phrenic crushing as an adjuvant to repair of the deficiency, and the routine use of a small stomach tube for lavage immediately before operation and to prevent regurgitation of stomach contents and their aspiration when the stomach is being replaced at operation. The author favours the abdominal approach. The mortality rate in the group under one year of age was more than twice that in the group from one to ten years of age.

Vascular Lesions of the Extremities.

THE three main types of vascular lesion of the extremities discussed by Paul G. Flothow (*The Western Journal of Surgery, Obstetrics and Gynecology*, June, 1940) are *thromboangiitis obliterans* (Buerger's disease), *endarteritis obliterans* (due to arteriosclerosis, syphilis *et cetera*) and vasomotor disturbances, such as Raynaud's disease. The pathology, symptomatology and diagnosis are reviewed. The value of hygiene of the feet, postural exercises, contrast baths and abstinence from tobacco are undoubted. Most other medical methods of treatment, such as fever therapy, vasodilatation and "Paevex" treatment, appear at the best to be of value for only a short time. However, as most patients suffering from these diseases are not suitable for surgical treatment, medical treatment must be resorted to in many cases. The author finds that from a fourth to a third of the patients suffering from Buerger's disease have an element of vasospasm, and these are therefore benefited by sympathectomy. Even in cases in which gangrene seemed inevitable, sympathectomy was sometimes performed with the object of encouraging healing of the wound stump, and in some of these cases the improvement was such that the amputation was avoided. In arteriosclerotic endarteritis as many as 75% of patients had varying degrees of spasm, and in many this was the major factor. Most of these patients are aged over sixty years, so it is with greater reluctance that operative procedures are advised. In Raynaud's disease, however, only a small percentage of patients need operation, and conservative measures relieve the symptoms adequately in most cases. When operation is performed, provided it is adequate, the results are excellent. Operation is preferred to injection of alcohol, because of the more lasting effect of sympathectomy, and also because of the danger of troublesome neuritis which may follow the injection of alcohol. The author makes a plea for closer cooperation between the physician and surgeon in the treatment of these diseases.

Pneumococcal Peritonitis.

L. E. ARNOLD (*Surgery*, April, 1940) discusses the present status of pneumococcal peritonitis and reports a case. The presence of diarrhœa is an important aid to distinction between this condition and acute appendicitis with peritonitis. The great danger of early operation and the desirability of awaiting localization of the pus are stressed. Abdominal puncture is of the greatest value in diagnosis and is considered to be practically free from danger. In the case reported the patient was treated along orthodox lines, including the administration of the appropriate type serum. In spite of this she became moribund, and recourse was had to non-specific immunotransfusion. A compatible donor was given 100,000,000 killed typhoid bacilli by intravenous injection, followed after an hour by a further 50,000,000. After seven hours his temperature was 104° F. and his leucocytes numbered 40,000 per cubic millimetre. Three hundred cubic centimetres of blood were withdrawn and given to the patient by transfusion. There was a dramatic response. The immunotransfusion was repeated twice, and improvement continued. Three weeks after the patient's admission to hospital a one-inch subumbilical incision was made and two and a half litres of pus were withdrawn. The author states that this method of treatment for pneumococcal peritonitis has not been reported previously, and expresses his conviction that it was solely responsible for the favourable result in the case described.

Varicose Veins.

S. Z. HAWKES AND G. F. HEWSON (*Surgery*, May, 1940) report a study of 600 consecutive unselected patients treated for varicose veins, and conclude that child bearing, a family history of varicose veins, phlebitis and injuries are the commonest underlying factors. The mechanism of the production of varicosities during pregnancy is not understood; the authors consider that the evidence of a purely mechanical effect is not complete, and that Sicard's suggestion of an endocrine basis cannot be excluded. The authors found ligation of the saphenous vein necessary in 74% of cases. They do not employ retrograde injection of sclerosing solutions at the time of ligation, having found that better cosmetic results are obtained when injection is delayed for two weeks. The veins are then collapsed and contracted.

Blood in the Peritoneal Cavity as a Preventive of Peritonitis and Adhesions.

E. G. JOSEPH (*Annals of Surgery*, April, 1940) presents a preliminary report of experimental and clinical observations on the effect of whole blood in the peritoneal cavity as a preventive against peritonitis and adhesions. Attention had been drawn to the subject by recoveries among patients who sustained severe abdominal injuries during the disturbances in Palestine in 1936. Uneventful convalescence was observed in some cases to follow injuries which had caused gross fæcal contamination of the peritoneum and intraperitoneal hæmorrhage. Experimental work on dogs and rabbits supported the belief that blood (citrated) reduced the incidence of peritonitis and adhesions. A clinical trial was made by the introduction of citrated blood into the peritoneal cavities of three patients, two suffering from ruptured peptic ulcers and one with a gangrenous appendix and pus in the peritoneal cavity. Uneventful recoveries occurred.

Reactions following Injections of Sodium Morrhuate.

L. DOBSON (*Annals of Surgery*, April, 1940) discusses untoward reactions following sodium morrhuate injections used in the treatment of varicose veins, and reports two cases in which severe reactions occurred. In these, and in most of the recorded instances, ill effects were encountered when injections of sodium morrhuate were resumed after an interval of some months or years. Dobson's patients showed symptoms of sensitivity with the resumption of injections; but these danger signals were overlooked in one

instance and were not mentioned by the patient in the other. The author considers that for the second of subsequent courses of injections small initial doses of not more than 0·5 cubic centimetre should be used, and the patient should be closely questioned regarding any reaction to previous injections. Such reactions are most commonly of an urticarial nature, but may be indicated merely by mild itching.

Uretero-Intestinal Anastomosis.

R. E. BRACKIN (*Archives of Surgery*, April, 1940) describes a method by which the ureters may be implanted in the sigmoid colon with the object of reducing the likelihood of peritonitis and other complications, such as ascending infection and pyelonephritis. The intact parietal layer of the peritoneum overlying the ureter is included in a lateral submucous uretero-intestinal anastomosis. The uretero-intestinal opening is established by a necrosing suture; a mattress suture of number 6 braided silk is inserted through the parietal layer of the peritoneum and the ureteral wall on one side and the intestinal mucosa and submucosa on the other, and runs parallel to the long axis of the ureter. The desired length of the suture should lie in the lumen of the ureter; this is accurately determined, and the suture is tied securely with a crushing effect on the tissues. The ureter above the necrosing suture is anchored in the intestinal incision by silk mattress sutures; these include, on the medial side of the ureter, the parietal layer of the peritoneum and the inferior edge of the intestinal muscularis. The suture on the lateral side of the ureter includes the parietal layer of the peritoneum and the superior edge of the intestinal muscularis. The intestinal musculature is closed over the ureter at the site of the necrosing suture and distally by silk mattress sutures, which include both edges of the intestinal muscle and pass under the ureter. The whole field is covered with peritoneum. The operation is performed on the right side first and on the left side three weeks later. The results of this procedure are that the peritoneal reaction prevents leakage and tends to localize and absorb the products of post-operative infection. The physiological character of the ureter is preserved by delaying of section of the ureter.

The Operative Treatment of Hernia.

SURGEON REAR ADMIRAL C. P. G. WAKELEY (*The Lancet*, May 4, 1940), in his Hunterian Lecture before the Royal College of Surgeons of England, stresses the importance of gentleness in the operative treatment of hernia, and urges that a surgeon can do more for the community by operating upon hernia and keeping his recurrence rate low than he can by operating upon malignant disease. In the Royal Navy Medical Service there is an excellent follow-up system for all patients suffering from hernia, with a special card for primary and another for recurrent hernia. The author points out that only when patients are carefully followed up can the results of such procedures be properly evaluated. The use of *fascia lata* grafts is deprecated because of the difficulty of freeing the tissue from fat and the size of the needle needed for its insertion. Silk is recommended for suture material because of its ease of sterilization and its secure knots. Strict attention is paid to the condition of the respiratory tract before operation so as to avoid cough. For anæsthesia the author favours "Avertin" with nitrous oxide and oxygen; he insists upon twenty-one days in bed, proper supervision during convalescence of a month, and no hard manual labour for six months.

Massive Doses of Lugol's Iodine in the Treatment of Acute Secondary Parotitis.

D. J. LEITHAUSER AND M. O. CANTOR (*Annals of Surgery*, April, 1940) report the results of treatment with massive doses of Lugol's iodine of 13 patients suffering from acute secondary parotitis. The authors have now used this method in 23 cases, with only one death, and they claim that the patient who died had recovered from her parotitis when she succumbed to bronchopneumonia. Lugol's iodine is given orally, subcutaneously and intravenously. The total quantities used for each patient varied from 120 minims to 1,670 minims. In the majority of cases the organism recovered was the *Staphylococcus aureus*. The authors regard incision of the parotid gland as dangerous, and aspirate any abscess which may form through a wide-bore needle. They used Lugol's iodine with satisfactory results in the treatment of parotitis due to mumps.

The Injection Treatment of Hernia.

L. DOBSON (*Surgery*, June, 1940) reports a series of experiments upon dogs which have a patent *processus vaginalis* comparable with a hernial sac, and combines the results of these experiments with extensive clinical experience in an article written to answer the questions: What is the fate of the fibrous tissue after a period of a year or more? What happens to the hernial sac? Can scar tissue alone cure a hernia? What are the types of hernia suitable for injection treatment? The author concludes that there are several different solutions which safely and painlessly produce fibrous sheets and that these sheets contract to form scattered islands of compact fibrous tissue. The sac is rarely obliterated or even occluded at the neck. Muscle fibres are destroyed by the solutions and are replaced by fibrous tissue which eventually stretches. The author considers that cure is effected only by means of the fibrous tissue which persists between the fascial planes, muscle layers and spermatic cord. These adhesions hold the sac compressed and prevent omentum or bowel from entering the neck of the sac. Injection treatment should be used only in small indirect inguinal herniæ in patients who have good abdominal structures and who will not or cannot undergo operative treatment.

Changes in Venous Pressure during Abdominal Operations.

J. R. VRAL AND H. H. HUSSEY (*Surgery*, June, 1940) have elaborated a method of measuring blood pressure in the antecubital and saphenous veins in order to determine whether operative procedures on the abdomen may have an effect upon venous pressure and therefore retard the flow of blood in veins, thus causing post-operative thrombosis. A needle connected to a syringe and three-way stopcock and manometer is inserted into the vein, and the pressure is measured in millimetres of normal saline solution. All the operations were performed upon patients in the supine position. The use of spinal anæsthesia appeared to make no difference to the venous blood pressure in comparison with general and local anæsthesia. Opening of the peritoneal cavity appeared to have no effect. Exploration of the abdomen, however, and the application of any pressure by packs or the hand inside the abdomen caused a disturbance in the saphenous vein, but not in the antecubital vein. The authors consider that the magnitude of this rise is not sufficient to evoke a predisposition to venous thrombosis.

Treatment of Undescended Testis by Hormonal Therapy.

C. E. REA (*Surgery*, June, 1940) critically discusses the use of gonadotropic hormones. The author insists upon correct classification of cryptorchidism prior to the treatment, and gives a warning of the danger of bringing about precocious puberty in the immature male. This, however, can be prevented by careful attention to dosage. The author recommends that treatment should be withheld until the age of nine to eleven years; when it is given at that period it will show whether anatomical obstruction is present. Ten injections are given over a period ranging from ten days to three weeks. If no results are obtained, further treatment is given after a month's rest. After that, orchidopexy is performed. Hormonal therapy makes it possible to distinguish between those testes that require surgical intervention because of mechanical obstruction and those which do not.

Colles's Fracture.

J. H. MAYER (*The British Journal of Surgery*, April, 1940) draws attention to the mistaken impression that the results of treatment of Colles's fracture are uniformly good, and states that in 15% to 20% of cases imperfect or frankly poor results are obtained. Some patients may have perfect function even in the presence of slight persistent deformity; but for consistent results perfect anatomical replacement is essential. After careful Röntgenological studies many unsatisfactory results were found to be due to redisplacement after a perfect initial reduction. By the use of dissecting-room material, experimental Colles's fractures were produced and the displacements were studied by X-ray methods. The conclusion was reached that, in addition to the more usually recognized displacements, a common deformity was a rotation of the lower radial fragment round the head of the ulna in a direction of supination. This displacement is often indicated in the antero-posterior X-ray film by an apparent broadening of the lower radial fragment, which may overlap the upper fragment on both the inner and outer sides. To correct this deformity the wrist must be placed in a position of extreme pronation with slight flexion and ulnar deviation. To maintain this position the elbow joint is included in the plaster splint in a position of flexion to a right angle. Another common occurrence in Colles's fracture is injury to the lower radio-ulnar joint, usually an avulsion of the ulnar styloid by the fibro-cartilage or an avulsion of the radial attachment of the cartilage. In these cases, too, except when there is an associated fracture of the neck of the ulna, the full pronation position is used and the elbow is included. The author claims improved results since the adoption of this method of treatment.

Special Articles on Psychiatry in General Practice.

(Contributed by request.)

XIII.

DRUG ADDICTION.

PERSONS who take drugs to excess fall roughly into the following groups:

1. Those who are so poorly equipped by Nature with mental strength as to be unable to cope with the ordinary strains of living and whose nervous systems need some supplement to function harmoniously.

2. Those who at times, in some way, lose their normal mental strength and revert to the condition above. These correspond to recurrent mental breakdowns and the taking of drugs is merely a symptom, for example, as in recurrent alcoholism or dipsomania, and is frequently seen in mild depressive states.

3. Those who create a desire for such drugs by indulgence. Such persons are addicts by accident. This would include those who become addicts as a result of being given drugs for pain, sleep *et cetera*, the criminal addict due to bad company, and those who take drugs for their pleasurable effect. However, even in these cases there is much more likelihood of an unbalanced person becoming an addict than one who is balanced.

Precautions.

The greatest care should be taken by doctors in the giving of sedatives to sick persons. Morphine should seldom be given to induce sleep, but should be kept for cases in which severe pain or shock is present. If a sedative has to be given for insomnia, a sufficiently large dose of bromide or chloral or "Luminal" for three or four nights is generally sufficient to restore a normal sleep rhythm and allow time for the patient to develop proper mental adjustment of the factors causing insomnia if it is due to a mental cause. Much more can be done by a proper mental training in this regard than by drugs, although these may be necessary at first. However, once a nervous breakdown is threatened or precipitated, the giving of sedatives seems to help and does not in these circumstances cause addiction.

Sedatives should be prescribed in small amounts with a limited number of "repeats".

Alcoholism.

Alcoholism may be a symptom of manic-depressive psychoses, of schizophrenia, and even of anxiety neurosis. In this case alcohol is generally taken as a means of relieving unpleasant sensations and emotions. The forms of alcoholism are as follows:

Mania à Potu.—Mania à potu is a state of extreme excitement brought about by comparatively small doses of alcohol in a susceptible person, and sometimes in a normal person after head injuries.

Dipsomania.—Dipsomania is characterized by recurrent acute bouts of alcoholic indulgence. It is sometimes the symptom of a recurrent manic-depressive psychosis.

Delirium Tremens.—Delirium tremens may follow excessive taking of alcohol, but sometimes occurs after the sudden withdrawal of alcohol in chronic alcoholism. The symptoms are those of the more severe deprivation symptoms mentioned below.

Korsakoff's Syndrome.—Korsakoff's syndrome is a state of confusion with deficient memory and a tendency to confabulation and disorientation and hallucination. There is generally an associated polyneuritis. This condition frequently persists for months and sometimes ends in a permanent dementia.

Chronic Alcoholism.—Chronic alcoholism may develop simply by the daily habit of taking even a moderate amount of alcohol, or it may have to be taken to cover some nervous or mental weakness. There is generally a gradual deterioration of the physical, mental or moral capacities, and sometimes the condition ends in some permanent dementia.

Treatment of Alcoholism.

In an acute short bout alcohol can be substituted by other sedatives within three or four days without undue discomfort. Where alcohol is a symptom of neurosis or psychosis these will then be treated in the usual way. The best sedatives are a combination of bromides, "Luminal", chloral, and occasionally tincture of opium. "Medinal" and paraldehyde are the best drugs for procuring sleep. If restlessness is very bad, morphine, a quarter of a grain, and hyoscine, one one-hundredth of a grain, for one or two nights may be necessary. Reasonable intestinal elimination should be maintained, but not violent purging, as this weakens the patient. At first the diet should be very simple and should consist of milk, fruit and vegetable soups, and a fair amount of salt seems necessary to counteract the dehydration caused by the alcohol.

In *delirium tremens* and Korsakoff's syndrome, vitamin *B* and nicotinic acid should also be given. When sympathetic over-activity is marked, the régime for the treatment of morphinism can be followed.

Symptoms of Drug Addiction.

The taking of excessive quantities of drugs, such as morphine and cocaine, causes symptoms which are primarily the results of disturbance of nervous function, as these drugs act essentially on the nervous system. The symptoms are interference with the mental functions of thinking, concentration, memory and even of morality, *plus* irritability, nervous weakness, apathy, loss of interest and depression. Paræsthesiæ and sometimes even hallucinations and delusions are present. The gastro-intestinal tract becomes disturbed as a result of the nervous upset, and loss of appetite, abdominal pain, diarrhœa or constipation occurs, eventually leading to loss of weight, the development of sallowness and an appearance of ill health generally.

Deprivation Symptoms.—Deprivation symptoms occur when the patient is cut off from his supplies of the drug, and are as follows: sweating, trembling, rapid pulse, nausea, vomiting and abdominal discomfort and pains, diarrhœa, paræsthesiæ, feeling of fear and impending dissolution, restlessness, insomnia, and sometimes mental excitement, confusion and hallucinations.

Treatment of Morphinism.

All treatment should be carried out in a hospital specially dealing with such cases.

Gradual withdrawal is best, as sudden withdrawal will cause the patient much pain and suffering, and nearly always precipitate a condition of acute shock which may endanger the patient's life.

Laughton Scott has devised a "painless method" of treating drug addiction. His treatment is really a modification of the "Towns-Lambert" method, in which were administered increasing doses of belladonna and hyoscyamus with catharsis and rapid withdrawal of the drug. This was too severe and Laughton Scott has modified it considerably. It is based on the fact that in the condition of addiction the nervous system, and especially the autonomic nervous system, is in a state of dysharmony; that the sympathetic part is too responsive; and that this system is kept under, as it were, by means of the sedative drug and, in the case of morphinism, by its action, both as a sympathetic depressant and as a vagal stimulant. When the drug is removed, the sympathetic explodes, and it is this that causes the symptoms of collapse. In withdrawal Scott uses a sedative which calms sympathetic over-action, and he also uses the atropine group of drugs, which in small doses stimulate vagal activity; and this also tends further to neutralize sympathetic activity. "Luminal" is the sedative used, up to about eight grains a day if necessary.

For the first twenty-four hours the patient is allowed the daily amount of morphine that he was taking prior to starting treatment. The daily amount of morphine is dissolved in six cubic centimetres of normal saline solution, in which has been dissolved one one-hundredth of a grain of atropine, and half a cubic centimetre of this solution is given every two hours when the patient is awake. At the same time the patient is put on a mixture containing two parts of tincture of belladonna, one part of fluid extract of hyoscyamus, and one part of water. Fifteen drops are given in the first twenty-four hours, and the dose is increased by about ten drops a day till a maximum of about one hundred drops a day is reached.

"Luminal", four grains, is given at night and two grains are given at noon and a further two grains are given if necessary. The morphine can be reduced very rapidly in this way. The patient can generally manage on about two grains of morphine for the first two days; this can be reduced to one and a half grains for a further two days, then one grain for the next two days, then half a grain for two days. At this stage normal saline solution can be given alone, and when the patient has not received any morphine for three days he can be told.

Sufficient of the belladonna mixture should be given to produce a slowing of the pulse rate to just below normal and to just short of dryness of the mouth and ocular symptoms. If these appear, the dose of the belladonna

mixture should be dropped down to the previous stimulating dose. Any transient feelings of collapse can be counteracted by an extra dose of the morphine solution.

Once harmony has been established in the nervous system for three or four days, both the "Luminal" and the belladonna can be reduced very rapidly. During convalescence it is necessary to avoid exhaustion, as this tends to uncover the sympathetic and thus to cause symptoms again.

Psychotherapy begins with convalescence and offers the main hope of permanent recovery.

The outlook is not so bad under this treatment as before, because the patient, once having been got off the morphine painlessly, loses his fear of the power of the drug and will much more readily undertake the unpleasant task of its deprivation.

General Treatment.

Vomiting, which used to occur with rapid withdrawal, does not occur with the above treatment. The bowels should be well opened, but purging is to be avoided, as too much irritation of the intestine tends further to upset the nervous system. A simple diet of milk and fruit and vegetable soup for the first two or three days is best.

Other Hypnotics.

In addiction due to other hypnotics, such as "Luminal", chloral or paraldehyde, too rapid withdrawal is inadvisable, as it may cause delirium. Cautious tapering of bromide or "Luminal" is also necessary when a patient has been receiving these for epilepsy, as sudden withdrawal sometimes causes a succession of fits.

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British Medical Association News.

SCIENTIFIC.

A MEETING of the Victorian Branch of the British Medical Association was held on May 15, 1940, at the Royal Melbourne Hospital. The meeting took the form of a number of clinical demonstrations by members of the honorary staff of the hospital. Parts of this report appeared in the issues of August 10, August 24 and September 21, 1940.

Hæmatomyelia and Hæmatorrhachis.

DR. A. E. COATES showed a female patient, aged twenty-three years, who had fallen on her buttocks four years earlier. No serious symptoms followed immediately; but three and a half years prior to the time of the meeting she had complained of pain in the back and aching in the legs. One and a half years before the meeting difficulty in opening the bowels and later trouble in starting micturition caused her concern. Nine months before the meeting her feet became numb, and three months later she found that she had no control of the bladder. For the past three months she had had ataxia and difficulty in walking.

Examination revealed defective power, ataxia and loss of discriminative sense in the lower limbs. The right superficial abdominal reflex was absent and there was a band of anæsthesia on the right side at the level of the tenth and twelfth thoracic segments. The Wassermann test failed to produce a reaction. Cerebro-spinal fluid could not be obtained by lumbar puncture. An X-ray examination revealed widening of the intervertebral foramina in the lumbar region. A partial block to the injection of lipiodol occurred at the lower border of the third thoracic vertebra, and a complete block occurred at the first thoracic vertebra.

On March 13, 1940, laminectomy was performed, extending from the seventh thoracic to the fourth lumbar segments of the spine. The theca was found to be filled with old blood clot, green and yellowish brown in colour, distending the dura and compressing the cord and *cauda equina*. This matted mass extended from the seventh thoracic spinal segment down to the lowest lumbar area. There was a cystic condition of the sacral swelling of the cord. The organizing clot was removed by dissection, scraping and suction. The cyst in the cord was incised in the median fissure and yellow fluid was obtained. The dura was not sutured, but the muscles were carefully approximated and the skin wound was closed. Shock was minimized by a blood transfusion. Convalescence was steady and sensation in the legs returned in ten days. Motor power next recovered, and six weeks after operation the patient could walk, though her gait was somewhat ataxic. At this stage the anus was patulous, and only small quantities of urine could be passed. Position sense and discrimination then recovered, and she was able to empty the bladder completely. On May 14, 1940, she regained complete control of the anus, could walk (though with a slight turning inwards of the fett), and bladder control was normal. Dr. Coates said that during convalescence retino-chorioiditis developed, mainly in the patient's left eye; this was rapidly subsiding under treatment with "M & B 693".

Neuroblastoma of an Adrenal Gland.

Dr. Coates then showed a female patient, aged forty-five years, who had complained of a continuous boring pain in the right hypochondrium. Examination disclosed a round visible tumour in the right loin and flank; it could not be ballotted from the loin, and it was smooth and not tender; its upper border could be defined; it was dull to percussion. Neither the Casoni test nor the Wassermann test produced a reaction. A pyelographic examination indicated a large hydronephrosis and a deformity of the right ureter, and an outward bending of the ureter and kidney pelvis by some abnormal structure lying medially. Examination after a barium enema revealed a downward displacement of the hepatic flexure of the colon.

On August 10, 1939, through a right paramedium incision, the peritoneum was displaced medially and an extra-peritoneal tumour was found. It was adherent to the liver, duodenum and kidney, and also extended to the iliac vessels. The largest proportion of it was removed as one piece. It was firm, but soft, and was not unlike a large myoma of the uterus. The remaining cavity, lined by tumour tissue, was packed with gauze and drainage was instituted. Subsequent deep X-ray therapy was given and the course was recently repeated. Examination of a microscopic section of the tumour proved it to be a malignant adrenal neuroblastoma. At the time of the meeting the patient was quite well.

Intraventricular Tumour.

Dr. Coates next showed a male patient, aged sixteen years, who had complained of blurring of vision and headache of eight months' duration. Gross papilloedema was present in both eyes, and there was limitation of the visual fields, more pronounced on the right. The cerebro-spinal fluid was under a pressure of 300 millimetres of water, and the fluid was yellow in colour. An X-ray examination revealed a calcified area to the right of the mid-line anteriorly. Ventriculography revealed a displacement of the ventricular system to the left, an enormous dilatation of the lateral ventricles, and a filling defect in the right ventricle above the foramen of Monro.

On April 12, 1940, a fronto-temporal flap was cut and a circular cap of the frontal lobe, two inches in diameter, was removed from the right cerebral hemisphere. A sessile tumour was enucleated from the medial part of the floor of the right lateral ventricle. It was solid, and measured one inch by half an inch by one and three-quarter inches. Examination of microscopic sections revealed it to be an ependymoma. On April 25, 1940, the patient was able to walk about and his vision was improving. At the time of the meeting he was quite normal mentally and his eyes showed no evidence of papilloedema or field defect.

Arterio-Venous Aneurysm.

Dr. Coates then showed a male patient, aged forty years, who had complained of occasional headache of six months' duration. For seventeen days before his admission to hospital he had a severe throbbing pain accompanied by a "swishing" noise in the head and blurring of vision. For seven days he had noticed that his left eye was prominent, and he had double vision and could not keep the eye open. Examination revealed pronounced proptosis of the left eye, slight proptosis of the right eye, paralysis of the left third, fourth and sixth cranial nerves, œdema of the conjunctiva and congestion of the scleral vessels.

On auscultation there was a loud bruit to be heard over the head, synchronous with the pulse, and absent on compression of the left common carotid artery. Treatment was carried out in the following way. Compression of the common carotid artery for twenty minutes a day was applied for ten days. Under local anæsthesia the bifurcation of the left common carotid artery was exposed through an oblique incision. The internal carotid artery was temporarily occluded by tape; as the bruit in the head then disappeared, and as no paralytic signs were manifest, the artery was then completely occluded with stout linen thread over a strip of fascia cut from the neck. This operation was repeated and the external carotid artery was similarly

ligated. Care was taken not to tie the ligature so tightly as to rupture the interna; the cushion of fascia aided in bringing about simple apposition of the arterial walls. The patient's headache was immediately relieved. Three days later the proptosis was much less pronounced and his vision had improved. At the time of the meeting he had a full range of eye movements and was quite well. A slight proptosis was all that remained of the original condition.

Dr. Coates remarked that there was no history of injury, and it could be assumed only that the patient had ruptured a preexisting aneurysm of the internal carotid artery into the cavernous sinus.

Buerger's Disease.

Dr. Coates finally showed a male patient, aged forty years, who had suffered from cold, blue, ulcerating feet for three and a half years. Gangrene of all his toes had occurred, and he had lost the terminal segments of most of his toes. For ten months he had had continuous pain in the legs. The arterial pulse was present in front and on the inner side of both ankles. He had had occasional attacks of unconsciousness, preceded by sensory change in the face. His hands were blue. The blue feet, the presence of good arterial pulse and the loss of digits resembled a spasmodic condition of the vessels more than an obliterative lesion. The Wassermann test failed to produce a reaction. Intermittent venous occlusion was applied to the thighs by automatic means for six weeks, with no improvement. Lumbar sympathectomy through a bilateral muscle-splitting incision was performed on May 1, 1940. Resection of the third lumbar ganglion and of the sympathetic trunk for one inch on each side was carried out. Since operation the feet had been permanently warm, the ulcerated areas of the toes had healed and the patient was quite free from pain.

Renal Tumour.

DR. J. THOMSON TAIT showed the pyelograms and specimens of three patients from whom tumours of the kidney had been removed. All the patients were males, aged between forty and fifty years. In the first case a pyelogram revealed an irregular but definite filling defect in the outline of the upper calyx of the right kidney. A blood-stained efflux was observed from the ureteric orifice on that side, and the dye test showed that the function was correspondingly diminished. The right kidney contained a small rounded tumour in the upper pole, which bulged but did not penetrate the renal capsule, and the kidney was removed.

The second patient had a large and massive tumour, an active-celled carcinoma, involving the whole of the kidney tissue. He had complained of hæmaturia and pain in the left loin for two years; and a pyelogram revealed a gross defect in the filling of the left kidney, with absence of function on that side. After nephrectomy a course of deep X-ray therapy was given; but rapid extension took place to the ribs and glands.

The third patient had suffered from intermittent hæmaturia for two years, and repeated examinations had been made with negative results. Dr. Tait found a blood-stained efflux from the right ureteric orifice, and a pyelogram of that side revealed a persistent defect in the filling of the lower limb of the lowest calyx. The kidney was removed and was found to contain a large tumour at its lower pole. The growth was encapsuled and of soft papillary structure, with outlying nodules of hard carcinoma.

To illustrate the difficulty of diagnosis in some of these cases the films were also shown of a patient who had had sudden hæmaturia two years earlier. The films taken at that time by excretion and retrograde pyelography revealed varying defects in the filling of the right renal pelvis, but no defect was persistent in all the films. The patient had had no further bleeding until two months prior to the meeting, and the pyelogram taken then showed no change in the regular outline of the pelvis or calyces.

Dr. Tait commented upon the bad prognosis in these cases. The first two patients had died within six months of operation, with a recurrence of the growth in the renal fossa.

Radiological Exhibit.

DR. HOWARD F. PRAAGST showed a series of X-ray films. The first were those of a male patient, aged seventeen years, who gave a history of cough with blood-stained sputum of nine months' duration. The appearances of a bronchogenic carcinoma of the hilar region of the right lung were closely simulated by a partially collapsed hydatid cyst, which the patient later coughed up. The reactions to the blood complement fixation test and to the Casoni test were strongly positive.

The X-ray films of a male patient, aged thirty-nine years, who had been discharged from the second Australian Imperial Force with a diagnosis of pulmonary hydatid cyst, revealed a large, rounded, dense shadow at the base of the right lung, which had the radiological features of a hydatid cyst. The patient was a worker in the abattoirs and had been a sheep drover for six years. No reactions to the tests for hydatids were produced. At operation a simple cyst of the pleura was found, growing from the interlobar septum between the middle and lower lobes. This was excised.

X-ray films of a female patient, aged twenty-one years, showed extensive changes of *osteitis fibrosa cystica* in the skull, ribs, pelvis and long bones. This patient had been admitted to the hospital with a spontaneous fracture through a cystic area in the humerus, and a parathyreoid tumour had been removed since her admission. Insufficient time had elapsed since the operation to demonstrate any reparative changes in the bones.

(To be continued.)

NOTICE.

Golf Tournament, Victorian Branch.

OWING to the war, the championship event will not be held, but the handicap event for the perpetual trophy will take place at the Royal Melbourne Golf Links on Wednesday, October 9. The proceeds of the meeting will be given to the Lord Mayor's Fund for sufferers from the bombardment of London.

C. STANTON CROUCH,
Honorary Organizer.

Naval, Military and Air Force.

APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 190, of September 12, 1940.

CITIZEN NAVAL FORCES OF THE COMMONWEALTH.

Royal Australian Naval Reserve.

Appointment.—Robert Philip Booth is appointed Surgeon Lieutenant, dated 15th August, 1940.

AUSTRALIAN MILITARY FORCES.

NORTHERN COMMAND.

First Military District.

Australian Army Medical Corps.

To be Captain (provisionally)—Harry Clarendon Whittle, 5th August, 1940.

Australian Army Medical Corps Reserve.

To be Honorary Captains—Wyndham Edward Green, Bernard Leo Rosenstengel, Humphrey James Gordon Williams, Arthur John Huxham and Kenneth John Maurice Watson, 5th August, 1940.

EASTERN COMMAND.

Australian Army Medical Corps.

To be Captains (provisionally)—Arthur Bernard Sullivan and Innes Albert Brodziak, 21st May, 1940; Raymond Hannay Kaines, 3rd June, 1940; Andrew Parkes Findlay, Ian Lovell Duncan, Robert Bradley Speirs and Henry Oliver Lancaster, 30th June, 1940; Arthur Harold Hodge, 4th July, 1940; James Michael Byrne and John Perceval Higgin, 5th July, 1940; Maurice William Ginsberg and James Frank Stewart McKee, supernumerary to establishment pending absorption, 9th July, 1940, and 10th July, 1940, respectively; Robert Dick, 15th July, 1940; Roderick Clarke Johnston, 23rd July, 1940; Walter Rex Frost and John Rowland Black, 24th July, 1940; and John Camfield Balzer, 3rd August, 1940. Major R. E. Longworth is appointed from the Reserve of Officers (A.A.M.C.), with regimental seniority next after Major D. R. Brown, M.C., 18th July, 1940; Captains L. E. Odlum and P. G. Heffernan are appointed from the Reserve of Officers (A.A.M.C.), 5th June, 1940, and 4th July, 1940, respectively. The following Honorary Captains are appointed from the Reserve of Officers (A.A.M.C.), and to be Captains (provisionally), as from the dates shown: J. I. Robertson, 19th June, 1940; S. Day and H. I. Turnbull, 30th June, 1940; F. R. Cumming, 10th July, 1940; A. H. Shappere and J. R. B. Beaumont, 27th July, 1940. Major (temporarily) E. C. Egan and Captains (provisionally) A. M. Barron, R. P. Melville, C. R. Furner, C. W. England and A. P. Gunning are brought on the authorized establishment, 6th

August, 1940; the resignation of Captain (provisionally) W. G. Gailey of his commission is accepted, 18th June, 1940; the provisional appointment of Captain W. L. Fowles is terminated, 13th June, 1940.

Unattached List.

Colonel F. A. Maguire, C.M.G., D.S.O., V.D., is transferred to the Reserve of Officers (A.A.M.C.), 1st January, 1940; Lieutenant-Colonels W. R. C. Beeston, V.D., and E. H. Rutledge, E.D., are transferred to the Reserve of Officers (A.A.M.C.), 1st September, 1939, and 22nd March, 1939, respectively.

Australian Army Medical Corps Reserve.

To be Honorary Captains—Geoffrey Noel Manning Aitkens and Arthur Edward Harrison Salter, 4th July, 1940; Sidney Solomon Roseberry, 8th July, 1940; William Wallace Cameron, 11th July, 1940; Eric Hyam Friedman and John Cribben, 12th July, 1940, and 29th July, 1940, respectively.

SOUTHERN COMMAND.

Third Military District.

Award of Australian Efficiency Decoration.

Australian Army Medical Corps.—Lieutenant-Colonel (Temporary Colonel) F. E. Keane, M.C.

Sixth Military District.

Australian Army Medical Corps Reserve.

Honorary Lieutenant I. R. Elliott is retired.

WESTERN COMMAND.

Australian Army Medical Corps.

To be Captains (provisionally)—William Heitland Godby, Lincoln William Martin and Lindsay Poplan Gray, 4th July, 1940, Harry Campbell Pope, 9th July, 1940, Frederick Howard Vincent and Norman Lewis Cass, 26th July, 1940.

Australian Army Medical Corps Reserve.

Reserve of Officers (A.A.M.C.).—To be Majors (temporarily)—Honorary Captains A. R. S. Vickers and B. Burnside, 20th June, 1940, and 21st June, 1940, respectively. *To be Honorary Captains*—Lindley David Hodby, 1st July, 1940, and Frederick William Stewart Finch, 26th July, 1940. Honorary Major T. Ambrose is retired.

ROYAL AUSTRALIAN AIR FORCE.

Permanent Air Force: Medical Branch.

Flight Lieutenant E. C. Heffernan is granted the temporary rank of Squadron Leader with pay of that rank with effect from 1st September, 1940.

Citizen Air Force: Medical Branch.

The following are granted commissions on probation with the rank of Flight Lieutenant, with effect from 12th August, 1940: Bryan Willis Monahan, M.B., B.S., John William Reid, L.R.C.P. & S. (Ed.), L.R.F.P. & S. (Glasgow), and James Struan Robertson, M.B., B.S.

The following Flight Lieutenants are granted the temporary rank of Squadron Leader, with pay of that rank, with effect from 1st September, 1940: J. G. Brown, A. B. Anderson, R. I. Greenham, R. R. McDonald, S. G. Preston and D. S. Thomson.

The probationary appointments of the following Flight Lieutenants are confirmed: F. F. Ellis, I. R. Horn, T. Burfitt, C. J. Cummins, D. J. Prentice, E. S. Peters, L. J. T. Murphy, M. L. Creightmore, C. P. Ley, I. H. Cuming, R. G. Morris, D. E. Davies, R. Greenlees, A. N. Poulton, J. D. G. Dunn and P. R. Delamothe.

The following Flight Lieutenants are granted the acting rank of Squadron Leader, with effect from 1st September, 1940: J. C. Fulton, O.B.E., and P. R. Delamothe.—(Ex. Min. No. 64—Approved 10th September, 1940.)

Flight Lieutenant A. C. Blumer, M.B., B.S., is transferred from the Reserve to the Active List, with effect from 23rd July, 1940.—(Ex. Min. No. 61—Approved 10th September, 1940.)

Reserve: Medical Branch.

Henry Rupert Hawkins, M.B., B.S., is granted a commission on probation with the rank of Flight Lieutenant, with effect from 7th August, 1940.—(Ex. Min. No. 62—Approved 10th September, 1940.)

MEDICAL PRACTITIONERS TO NOTIFY CHANGE OF ADDRESS.

ANY medical practitioner changing his or her permanent address is requested to notify immediately the change to the undersigned. A correct record in the office of the Central Committee of the addresses of all medical practitioners is essential to meet contingencies that may arise in an emergency.

R. M. DOWNES,
Chairman,
Central Medical Co-ordination Committee, Victoria Barracks.

Correspondence.

REORGANIZATION OF THE MEDICAL PROFESSION.

SIR: In the matter of reorganization of the medical profession, Sir James Barrett's letter in your issue of September 14 may well be answered under three heads.

First as to Sir Basil Blackett's statement. I find it impossible to believe that the institution of national insurance has increased the amount of disease in England; and I suggest that the figures on which Sir Basil based his statement really indicate not that there is more sickness, but that more people are being treated for sickness, which would be a very different matter, and a tribute to the improvement in medical care of the public since the insurance acts became law. That disease is more costly I can well believe. It is getting costlier all the world over with every year that passes. It is more costly to treat pneumonia with sulphapyridine and "Carbogen" than with a diaphoretic mixture and brandy. It is also more costly to treat cases in hospital than it was in their homes. But in both cases the extra cost is accompanied by an increased effectiveness that more than outweighs it.

Secondly, no one has a greater admiration for the whole system of Bush Nursing Associations and their hospitals than I have. They have filled a very great need in caring for sick people on a cooperative basis, and everyone connected with them is justly enthusiastic over their success. But I am afraid I cannot see that they offer any solution of the problems of medical organization as I set them out in my paper. In fact, and I want to say this with the kindliest possible feelings towards them, they may, owing to the fact that by their very success they divert the attention of their sponsors away from the major problem to a successful minor expedient, be classable among those half-measures admirable in themselves but not going far enough, to which I referred as dangers standing in the way of effective reorganization.

The third point expressed by Sir James Barrett, and also previously by Dr. John Dale, is that the medical profession should organize itself in free association. With that I most heartily agree; but I am afraid it seems plain to me that for any such organization to be successful it must have government sanction and governmental authority. Anyone who has had anything to do with the activities of our own professional association along these lines must surely realize that no efforts could possibly be successful on any other basis. There are sad examples in our recent history. It is in an endeavour to get our own profession to act boldly and so organize itself before organization is forced on it from outside that I make my appeal. It is not enough to say "Something must be done, but not this; we must organize, but not in this manner", and then settle back comfortably in the rut that leads steadily downwards. Our profession holds plenty of men of brains, vision and organizing ability. I urge them, for the sake of the public and of the profession, to bend their minds to constructive thinking for the future, while there is still time for us medical men to exercise any real influence on what that future is to be.

Yours, etc.,
ARTHUR E. BROWN.

Colac,
Victoria,
September 14, 1940.

Obituary.

SYDNEY STEWART SHIRLOW.

THE late Dr. Sydney Stewart Shirlow, whose death was recorded recently in these pages, was born at Darlinghurst, Sydney, in 1868. He received his early education at the Sydney Grammar School and studied medicine at the University of Sydney, where he graduated as a Bachelor of Medicine and Master of Surgery in 1892. In the following

year he went abroad for post-graduate study. He served for a period as clinical assistant at the Central London Throat and Ear Hospital. He subsequently studied dermatology at Saint John's Hospital for Diseases of the Skin, London, and pædiatrics at Great Ormond Street Hospital. After being attached to Guy's Hospital on the medical and surgical sides he went to Vienna, where he worked under the famous Politzer.

On his return to Australia, Shirlow soon found a home at Balmain, then a flourishing suburb of Sydney. Here he built up an extensive general practice. Naturally he devoted a great deal of attention to diseases of the ear, nose and throat, and established a reputation for himself that extended beyond the confines of his suburb. He was a reserved man, but when he gave friendship he was steadfast and unfailing. He could be trusted, and was trusted, by his brother practitioners. Nothing that he did was spectacular, but his actions were prompted by shrewd common sense and diagnostic insight. He had a sense of humour sometimes unsuspected by those who did not know him well, and when in the mood could be a good raconteur. He volunteered for service in the war of 1914-1918 and was sent to England in 1917. After an eventful voyage, in which he was wrecked in the Mediterranean Sea, he reached England, only to be stricken by an illness that took toll of his vitality and made his immediate return to Australia imperative. Soon after his return he took up practice at Cheltenham, but he was far from well, and carried on his work with difficulty. Eventually his illness became more pronounced and he had to retire from practice. He bore his long and trying malady with fortitude, and when the end came it was surprisingly sudden. Sydney Stewart Shirlow was one of those who are being known as members of the old school, and he leaves behind him many friends and confidants. He was married twice and is survived by his widow, three sons and two daughters.

The Royal Australasian College of Physicians.

EXAMINATION FOR MEMBERSHIP.

THE following candidates were successful at the recent examinations for Membership of the Royal Australasian College of Physicians and were admitted as Members on September 6, 1940:

Dr. R. E. Armati, Dr. Lorna D. Beveridge, Dr. E. Beatrix Durie, Dr. W. I. T. Hotten, Dr. G. A. W. Johnston, Dr. Stuart V. Marshall and Dr. G. Bruce White, of New South Wales.

Dr. R. O. Mills, of Victoria.

Dr. F. O. Bennett, of Christchurch, New Zealand.

Corrigendum.

WE have received the following communication from Dr. J. B. Devine, under date of September 17, 1940:

> In my article of September 7, 1940, entitled "The Value of Pre-Operative Estimations of the Serum Protein Concentration in Gastric Surgery", it is stated on page 215 that "there is suggestive statistical evidence that there is a relation between the serum albumin concentration and the occurrence of post-operative complications. The chances that this is a coincidence are about 1 in 20."
>
> This statement was printed owing to a misunderstanding with Dr. Reid, and it must be clearly stated that no relationship between the serum albumin concentration and the occurrence of post-operative complications was deduced by statistical methods.

Nominations and Elections.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Condon, Richard Daniel, M.B., B.S., 1939 (Univ. Sydney), Main Road, Scarborough.

Books Received.

"Furneaux's Human Physiology"; new edition, completely revised (nurses' edition), by W. A. M. Smart, M.B., B.S., B.Sc., M.R.C.S., L.R.C.P., F.Z.S; 1940. London: Longmans, Green and Company. Crown 8vo, pp. 384, with illustrations. Price: 5s. net.

Diary for the Month.

OCT. 1.—New South Wales Branch, B.M.A.: Council (Quarterly).
OCT. 2.—Western Australian Branch, B.M.A.: Council.
OCT. 2.—Victorian Branch, B.M.A.: Branch.
OCT. 3.—South Australian Branch, B.M.A.: Council.
OCT. 4.—New South Wales Branch, B.M.A.: Annual Meeting of Delegates.
OCT. 4.—Queensland Branch, B.M.A.: Branch.
OCT. 8.—New South Wales Branch, B.M.A.: Executive and Finance Committee Organization and Science Committee.
OCT. 8.—Tasmanian Branch, B.M.A.: Branch.
OCT. 11.—Queensland Branch, B.M.A.: Council.
OCT. 15.—New South Wales Branch, B.M.A.: Ethics Committee.
OCT. 16.—Western Australian Branch, B.M.A.: Branch.
OCT. 22.—New South Wales Branch, B.M.A.: Medical Politics Committee.
OCT. 23.—Victorian Branch, B.M.A.: Council.
OCT. 24.—New South Wales Branch, B.M.A.: Clinical.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associate Friendly Societies' Medical Institute; Proserpine District Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia.

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